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AT HARVARD COLLEGE
Vol. XCV, No. 1

REVISION OF THE AFRICAN LIZARDS OF THE FAMILY CORDYLIDAE

By Arthur Loveridge

With Twelve Plates

CAMBRIDGE, MASS. U. S. A.
PRINTED FOR THE MUSEUM
November, 1944

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE

The BULLETIN and MEMOIRS are devoted to the publication of investigations by the Staff of the Museum or of reports by specialists upon the Museum collections or explorations.

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No. 1.—*Revision of the African Lizards of the Family Cordylidae*

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INTRODUCTION

That the name ZONURIDAE should have been employed by Boulenger (1884a), was most unfortunate, for *Zonurus* Merrem (1820) was antedated by *Cordylus* Laurenti (1768), as has been pointed out by Stejneger (1936b). As article 5 of the International Rules of Nomenclature requires that the family name be based on the type genus, CORDYLIDAE must replace ZONURIDAE, however much such major changes are to be deplored.

In 1885 Boulenger recognized the family as comprised of 14 species, as against 48 forms enumerated in the present revision. In 1930 Power, when preparing a key to the South African species of the genus "*Zonurus*", listed 18 members and, though two of these (*capensis* and *robertsi*) are here transferred to *Pseudocordylus*, no fewer than 28 species and races of *Cordylus* are accepted in the present paper. Apart from desultory comments, no revisionary work[1] has been done on *Pseudocordylus* or *Platysaurus*, but Boulenger (1899c) furnished a synopsis of the 7 species of *Chamaesaura*, now reduced to 5 forms by synonymy.

The present revision, like others in the series[2], is an attempt to furnish a synopsis of all additions to our knowledge of the family since 1885, and a serious endeavour to arrange its members according to probable lines of evolution. In this connection I entertain doubts as to

[1] The present revision (completed in the summer of 1942) was just going to press (1944) when a copy of FitzSimons' (1943) "The Lizards of South Africa," was received. The two new races of Cordylidae which he describes have been included or discussed in this revision and a few footnotes and comments inserted, but his book must be consulted for other data, English names for most of the species, and many fresh locality records. While we are in substantial agreement as to the entities of most forms, my phylogenetic conclusions are so widely divergent from the arrangement devised by FitzSimons that it must be left to others to decide which more truly represents the probable lines of descent.

[2] Revision of the African Lizards of the Family Amphisbaenidae, 1941, Bull. Mus. Comp. Zoöl., **87**, pp. 353-451.
Revision of the African Lizards of the Family Gerrhosauridae, 1942, Bull. Mus. Comp. Zoöl., **89**, pp. 483-543., etc.

whether the order in which the species of *Cordylus* are arranged, should not be largely reversed; it is difficult to believe that so well protected a species as *giganteus* should have given rise to less spinose forms without osteoderms, though such species might gain in activity. However, without adequate grounds for change I have accepted Boulenger's order though attracted by the idea that *Platysaurus*, through *Pseudocordylus*, gave rise to some species of *Cordylus* like *caeruleopunctatus* lacking osteoderms. Cape Province, inhabited by 19 species or races, or the mountainous Transvaal with 17, would certainly appear to be the centre of speciation.

This opportunity is taken of expressing my deep appreciation of the kindness shown by Dr. V. FitzSimons of the Transvaal Museum in checking over my redescriptions of five of the *Cordylus* described by him and inserting additional information regarding them; for amending the spelling of many place names and answering numerous questions as will be seen from the footnotes. It is with much pleasure that one of the two novelties:

PLATYSAURUS GUTTATUS FITZSIMONSI subspec. nov.

is named after the author of "The Lizards of South Africa." The other:

PSEUDOCORDYLUS LANGI spec. nov.

is named for Mr. Herbert Lang whose activities have enriched so many collections and greatly contributed to our knowledge of the reptiles of Africa.

I wish also to thank Dr. Walter Rose for generous permission to reproduce figs. 2 and 3, on pls. vi and xii respectively, which are taken from his book "Veld and Vlei."

Geographical Distribution of the family Cordylidae	Ethiopia	Uganda Protectorate	Kenya Colony	Tanganyika Territory	Mozambique	Nyasaland	Northern Rhodesia	Southern Rhodesia	Bechuanaland	Transvaal	Zululand	Natal	Orange Free State	Cape Province	Southwest Africa	Angola	Belgian Congo
Cordylus giganteus																	
" *w. warreni*																	
" *w. barbertonensis*																	
" *w. perkoensis*																	
" *w. vandami*																	
" *w. depressus*																	
" *w. laevigatus*																	
" *w. breyeri*																	
" *caeruleopunctatus*																	
" *villifer*																	
" *c. rivae*	*																
" *c. tropidosternum*			*														
" *c. jonesii*				*													
" *c. angolensis*					*												
" *c. rhodesianus*					*	*											
" *c. lawrenci*								*									*
" *c. tasmani*								*	*	*			*				
" *c. minor*									*	*	*	*		*			
" *c. cordylus*										*					*		
" *c. niger*										*		*				*	
" *peersi*										*			*				
" *ukingensis*				*										*			
" *macrophotis*														*			
" *cataphractus*														*			
" *pustulatus*														*			
" *namaquensis*														*			
" *campbelli*														*			
" *p. polyzonus*														*			
" *p. jordani*														*			
Pseudocordylus capensis															*		
" *robertsi*															*		
" *langi* spec. nov.															*		
" *m. melanonotus*															*		
" *m. namaquensis*															*		
" *m. microlepidotus*															*		
" *m. fasciatus*															*		
Platysaurus g. rhodesianus								*									
" *g. fitzsimonsi* subsp. nov.									*								
" *g. guttatus*										*							
" *g. torquatus*						*				*							
" *g. wilhelmi*										*							
" *g. minor*										*							
" *g. orientalis*										*							
" *capensis*										*							
Chamaesaura aenea											*						
" *a. anguina*											*						
" *a. lenuior*		*									*						*
" *miopropus*			*			*										*	
" *macrolepis*			*													*	
Total number of forms recorded	1	1	2	4	3	2	0	4	4	17	6	6	5	19	7	2	2

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* Represented in the collections of the Museum of Comparative Zoölogy; examples of species without asterisk are earnestly desired.

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Family CORDYLIDAE

1845. *Zonuridae* Gray (part), Cat. Lizards Brit. Mus., p. 45.
1845. *Chamaesauridae* Gray, Cat. Lizards Brit. Mus., p. 61.
1884a. *Zonuridae* Boulenger, Ann. Mag. Nat. Hist. (5), **14**, pp. 119, 121.
1923. *Zonuridae* Camp, Bull. Am. Mus. Nat. Hist., **48**, pp. 297, 331.
1937b. *Cordylidae* Mertens, Abhand. Senckenberg. Naturf. Ges., No. 435, p. 8.

For further synonymy see Boulenger, 1885e, Cat. Lizards Brit. Mus., **2**, p. 251, from whom the following definition is adapted after incorporation of most of the findings of Camp (1923), who should be consulted for further details.

Habit robust, moderate, or serpentiform; head covered with symmetrical shields; eyes present; eyelids well developed; tympanum distinct or deeply sunken; dentition pleurodont, teeth numerous, small, hollow at the base, with long cylindrical shafts; palate toothless; tongue short, villose, scarcely protractile, entire or very feebly nicked at the end; body scales, if not granular, forming regular transverse series; lateral fold present or absent; limbs well developed or rudimentary or absent anteriorly; femoral pores present (though often indistinct in females); tail stout and spinose, or moderate, or excessively long and fragile.

Skull with both postorbital and frontosquamosal arches present; head with dermal bony shields in *Cordylus*; nasals distinct; frontal, parietal, and premaxillary single; lower jaw composed of six bones; palatines and pterygoids widely separated medially, both bordering the infraorbital fossa; postorbital and frontosquamosal arches bony;

supratemporal fossae roofed over by dermal ossifications; zygosphenal articulation rudimentary; clavicle slender, not dilated proximally, interclavicle cruciform with tendency to dilation; sternum without fontanelle; no abdominal ribs; non-tuberculate osteoderms present in most species of *Cordylus*.

Range. Africa south of Giacorsa, Ethiopia, i.e. about 5° N. (Reported from Madagascar in error by Cope).

Remarks. Camp (1923) places CORDYLIDAE (as ZONURIDAE) in a super-family Zonuroidea at the end of the section Anguimorpha, division Autarchoglossa of the suborder Sauria, thus removing it far from the IGUANIDAE, but placing it near the ANGUIDAE, the two families between which it was accorded an intermediate position by Boulenger (1885e). He would further recognize two subfamilies, *i.e.* Zonurinae and Chamaesaurinae, the former would now have to be termed Cordylinae.

Key to the Genera

1. Habit serpentiform; limbs short, often rudimentary, or fore limbs absent; uninjured tail at least thrice the length of head and body; ear-opening moderate or small; no collar fold; ventrals lanceolate like dorsals ..... *Chamaesaura* (p. 98)

   Habit normal; limbs well developed, pentadactyle; tail less than twice the length of head and body; ear-opening large; a collar fold at least laterally distinct; ventrals squarish or transversely enlarged 2

2. Dorsal lepidosis entirely granular; usually a color pattern of three, light, longitudinal lines, or series of spots, on back, though sometimes absent in old males ..... *Platysaurus* (p. 82)

   Dorsal lepidosis heterogeneous or composed of large scales 3

3. Nape covered with granules, or if dorsals extend to occiput they are much reduced; back usually covered with granules intermixed with nodular scales or dorsals, the latter small, soft, and devoid of underlying osteodermal plates ..... *Pseudocordylus* (p. 66)

   Nape covered with well developed scales like the dorsals, the latter strong, usually[1] with underlying osteodermal plates ..... *Cordylus* (p. 9)

[1] Absent in *caeruleopunctatus*.

Genus Cordylus

1763. *Cordylus* Gronovius, Zoophyl., p. 13 (type *cordylus* Linnaeus). Set aside by action of International Commission of Zoological Nomenclature (Opinion 89).

1768. *Cordylus* Laurenti (part), Syn. Rept., p. 51 (type *verus* Laurenti = *cordylus* Linnaeus).

1820. *Zonurus* Merrem, Versuch Syst. Amphib., p. 57 (type *cordylus* Linnaeus).

For further synonymy (but omit *Hemicordylus* Smith), see Boulenger, 1885e, Cat. Lizards Brit. Mus., **2**, p. 252.

Head and body depressed; limbs well developed; tail moderate. Head shields regular; nostril pierced in the nasal; eyelids well developed; ear-opening large; 4 parietals; sides of neck covered with scales; no collar fold; dorsals large, usually bony[1], forming regular transverse series extending to occiput; ventrals large, quadrangular or subtriangular, juxtaposed or imbricate, forming longitudinal and transverse series; femoral pores present in both sexes; digits slightly keeled inferiorly; tail spinose.

Those species which I have examined appear to have the following characteristics in common, consequently these have been omitted from the specific descriptions.

Head longer than broad; rostral at least twice as broad as high; postnasal present only as an aberration; a preocular; anterior supraocular longest, the second broadest; frontal subpentagonal or subhexagonal, slightly broader anteriorly; occipitals present (except in *caeruleopunctatus*); mental rather large; a slight lateral fold; a pair of enlarged preanals (though in *p. polyzonus* and *p. jordani* occasionally subequal, and said to be so in the juvenile type of *c. rivae);* limbs above with large, keeled spinose, imbricate scales.

Range. Africa, in savanna areas south of Ethiopia, i.e. about 5° N.

Remarks. Stejneger (1936b, p. 137) has set forth the reasons for recognizing *Cordylus* Laurenti, in contradistinction to *Cordylus* Gronovius, and regarding Merrem's monotypic *Zonurus* as a synonym.

Despite the fact that for half-a-century herpetologists have been pointing out the instability in shape (pentagonal, hexagonal, etc.) of head shields in this genus, and consequently their uselessness for taxonomic purposes, others continue to stress these unimportant variations as if they were of value. Which upper labial is lowest and which

[1] No osteoderms in young *giganteus* (*fide* Broom), or *caeruleopunctatus* which, in the absence of occipitals and reduced nuchals, shows affinities with *Pseudocordylus.*

highest also appears largely fortuitous and might well be dropped from future descriptions though I have included here all the available data for some species. It might be worth pointing out that the subocular descends to the lip in the *warreni* group, *c. niger, peersi,* and the two forms of *polyzonus.*

Suboculars normally number 3, with 2 or 4 occurring as variants; in the East African forms of *C. cordylus,* however, 2 has become normal at the expense of the third which has been reduced and pushed to one side, 2 also appears to be normal for a dwarf form (*macropholis*) known only from Kleinzee, Little Namaqualand. Van Dam has recorded 5 for *C. barbertonensis,* but this is apparently due to his inclusion of a small scale not truly a subocular.

Upper labials are normally 5 or 6, with 7 occurring as a common variant; only in the dwarfed *macropholis* are they reduced to 4 with 5 still the normal. Lower labials again are normally 5 or 6, with 7 occurring as a rare variation, here it is the dwarf *ukingensis* (known to me only from the holotype) which has reduced to 4. In the hope that the results might prove useful I counted the gulars lying between the angles of the jaws in all specimens in the Museum of Comparative Zoölogy, however as counts were not available for eight species I was unable to take advantage of this character.

The term postfrontals is employed as preferable to frontoparietals used by Boulenger and some others. As the head is longer than broad in all species except in old males of *cataphractus,* where it is as long as broad, this character has been dropped from the descriptions.

It will be noted that in the majority of species the keels, or spines, on the dorsum and dorsal aspect of the tail are less developed than on the flanks or sides of tail, hence it has not been considered necessary to repeat this for each species. The relative smoothness of the dorsals supposedly facilitates the lizard's entry and withdrawal from beneath boulders, while the lateral spinosities, especially when the lizard inflates, tend to catch on the sides of a rock crevice and prove a supplementary hindrance to the owner being withdrawn.

The state of the "lateral fold," characterized as "distinct," "weak," "slight," or "strong" by various authors, is largely a reflection of the state of nourishment of the individual being described. In an emaciated lizard taken after a prolonged drought it will appear "strong," in a gorged specimen or gravid female, scarcely perceptible. For this reason I have ignored the lateral fold for taxonomic purposes, though undoubtedly some degrees of variation in development occur as between certain species.

Color in members of the genus *Cordylus* seems to be particularly susceptible to environmental changes, as is evidenced by Peers, notes on *cataphractus* (*vide* p. 55). Too much importance, therefore, should not be attached to color in this genus.

This lizard—*cataphractus*—is the only member of the genus about which we have anything approaching a complete life history, and it is to Peers (1930), whose fascinating account should be consulted for further details, that we are indebted. His paper might well serve as a model to stimulate young South African naturalists to concentrate on other members of the genus with a view to filling in the deplorable gaps in our knowledge of the family.

Key to the Species

1. Lower eyelid opaque; supranasals absent 2
   Lower eyelid with transparent disk; supranasals present or absent (in one species only) 22

2. Rostral in contact with frontonasal; occipital spines present 3
   Rostral in contact with frontonasal only rarely, usually separated from it; occipital spines absent 6

3. Median subocular not reaching lip; occipital spines enormous; scales beneath forelimbs smooth; caudal whorls subequal, gradually diminishing towards tip of tail; range: Transvaal; Orange Free State; Cape Province ..... *giganteus* (p. 16)

   Median subocular reaches lip between two labials; occipital spines short; scales beneath forelimbs keeled; large caudal whorls separated by smaller ones 4

4. 34–42 dorsal scales between occiput and base of tail; range: Zululand ..... *w. warreni* (p. 19)

   24–32 dorsal scales between occiput and base of tail; range: Transvaal 5

5. 14–16 ventral scales across the belly ..... races of *warreni*[1]
   10–12 ventral scales across the belly; range: Waterberg Mountains, northwestern Transvaal ..... *w. breyeri* (p. 27)

[1] See full descriptions of various races found in mountains of eastern Transvaal.

6. No occipitals; nuchal scales of first six rows greatly reduced, minute; range: Cape Province ..... *caeruleopunctatus* (p. 28)

   Occipitals present; nuchal scales moderate or large ... 7

7. Nuchals comprising foremost, i.e. postoccipital, row, twice as large as those in second row; range: Bechuanaland; Transvaal; Zululand; Natal ..... *vittifer* (p. 30)

   Nuchals comprising foremost, i.e. postoccipital, row, subequal, certainly *not twice* as large as those in second row 8

8. Interparietal enclosed between two pairs of parietals .. 9
   Interparietal on a line with anterior parietals and in contact with (rarely separated from[1]) the postfrontals . 18

9. Dorsals elongate, the two vertebral rows not or but scarcely enlarged; laterals unlike dorsals 10
   Dorsals squarish, the two vertebral rows much enlarged; laterals like dorsals 15

10. Head moderately depressed; temporals moderate; gulars small 11
    Head much depressed; temporals large; gulars moderate or large 14

11. Femoral pores 3; nostril said to be pierced in centre of nasal; range: Ethiopia ..... *c. rivae* (p. 32)

    Femoral pores 5–8; nostril in lower centre of posteroinferior corner of nasal; range: Kenya Colony and countries to the south of Kenya 12

12. Ventrals in 28–34 transverse rows; size larger, length from snout to vent in adults 82–92 mm.; range: Kenya south to Mozambique and Southern Rhodesia ..... *c. tropidosternum* (p. 33)

    Ventrals in 22–27 transverse rows; size smaller, length from snout to vent in adults 64–74 mm. 13

13. Southern Mozambique; Southern Rhodesia (south of Bulawayo); Bechuanaland Protectorate (also introduced at Kimberly, Cape Province) ..... *c. jonesii* (p. 36)

    Southwestern Angola (known only from scanty description); probably northern South West Africa; possibly north-central Belgian Congo also ..... *c. angolensis* (p. 38)

[1] Sometimes in *namaquensis*.

14. Posterior parietals much larger than the anterior; dorsals in 27–28 transverse rows; ventrals in 14 longitudinal rows; range: Southern Rhodesia northeast of Bulawayo ..... *c. rhodesianus* (p. 40)

Posterior parietals subequal to the anterior; dorsals in 24 transverse rows; ventrals in 12 longitudinal rows; range: Little Namaqualand ..... *c. lawrenci* (p. 41)

15. Laterals on flanks slightly smaller than dorsals; range: Uitenhage Division, Cape Province ..... *c. tasmani* (p. 42)

Laterals on flanks just as large as the dorsals 16

16. Rostral 2½–4 times as broad as high; median subocular not, or but rarely, descending to the lip; color above brown or olive with or without markings; range: Cape Province (exclusive of parts of Uitenhage Division) .. *c. cordylus*[1] (p. 44)

Rostral 2–2¼ times as broad as high; median subocular descending to the lip between fourth and fifth labials; color above uniformly jet black 17

17. Head shields smooth or slightly rugose; nasal moderate, not or but slightly swollen; temporals large, rarely keeled; the two vertebral rows of dorsals enlarged; femoral pores 5–9; range: Cape Peninsula ..... *c. niger* (p. 48)

Head shields very strongly rugose; nasal large, very strongly swollen; temporals very large, strongly keeled; vertebral rows of dorsals not differentiated from adjacent dorsals; femoral pores 8–12; range: Little Namaqualand ..... *peersi* (p. 50)

18. 11–14 gulars between angles of jaws; the two vertebral rows of dorsals enlarged; 14–18 longitudinal rows of dorsolaterals; 9–12 longitudinal rows of ventrals 19

16–21 gulars between angles of jaws; vertebral rows of dorsals not enlarged; 20–32 longitudinal rows of dorsolaterals; 14–29 longitudinal rows of ventrals 20

[1] See also the recently described *C. c. minor* from Matjesfontein, C. P., said to differ from *c. cordylus* in having 24-36 longitudinal rows of dorsals, 16 rows of ventrals, only 4-6 femoral pores, and smaller size.

19. Gulars small, the anterior not enlarged; dorsals in 30 transverse rows; ventrals obtusely keeled, in 30 transverse rows; range: Southern Tanganyika Territory . . . *ukingensis* (p. 51)

Gulars very large, a few anterior ones moderately enlarged followed by a zone of much smaller ones; dorsals in 16–19 transverse rows; ventrals smooth in, 20–22 transverse rows; range: Little Namaqualand . . . *macropholis* (p. 52)

20. Dorsolaterals in 20–22 longitudinal rows and 15–16 transverse rows; range: Little Namaqualand . . . . . *cataphractus* (p. 53)

Dorsolaterals in 24–32 longitudinal rows and 30–32 transverse rows 21

21. Ventrals in 14 longitudinal rows; range: Central South West Africa . . . . . *pustulatus* (p. 57)

Ventrals in 18 longitudinal rows; range: Southern South West Africa . . . . . *namaquensis* (p. 58)

22. Supranasals absent; range: South West Africa . . . . . *campbelli* (p. 59)

Supranasals present; range: South West Africa 23

23. 10–19 femoral pores; upper posterior femorals scarcely larger or more spinose than the anterior; whorls of large scales at middle of tail separated by whorls of smaller ones; a dark streak on side of neck; range: South West Africa south of Aus . . . . . *p. polyzonus* (p. 60)

5–8 femoral pores; upper posterior femorals much larger and more strongly spinose than the anterior; whorls of large scales at middle of tail diminishing gradually towards tip of tail; no dark streak on side of neck; range: South West Africa north of Aus . . . . . *p. jordani* (p. 64)

Species	Rostral breadth into height	Supraoculars	Supraciliaries	Suboculars	Upper labials	Lower labials	Gulars between the posterior angles of jaws	Longitudinal rows of dorsals plus laterals	Transverse rows of dorsals	Longitudinal rows of ventrals	Transverse rows of ventrals	Femoral pores
giganteus	2–3	4	3	2–3	5–6–7	5	19–20	20	23–27	10–12	25–28	11
w. warreni	2¼–2¾	4	3–5	3	5–6–7	5–6	28	20–24	34–42	14	33–35	10–12
w. barbertonensis	2½–2¾	4	3–4	3[1]	5–6	5–6	26	20	28–32	14	31–36	10–12
w. perkoensis	2	4	4	3	5	6	?	18	28	14	28	12–14
w. vandami	2¼–2½	4	4	3	5–6	5–6	26–28	20	26–32	14–16	26–35	10–12
w. depressus	2	4	5	3	6	6	26	16	26	16	30	10
w. laevigatus	2¼	4	4–5	3	6	6	?	18	30	14	28	10
w. breyeri	2½	4	4–5	3[2]	6	6	?	18	24–26	10–12	24–26	12
caeruleopunctatus	2¼–2½	4	3	3	5–6	5–6	24–30	20–30	40–46	10	28–34	13–15
vittifer	3–4	4	3–4	3	5–6–7	5–6–7	19–24	20–24	23–27	14–16[3]	26–32[4]	6–8
c. rivae	?	4	3	2	?	6	?	20	24	12	25	3[5]
c. tropidosternum	2–2½	4	3–4	2	5–6	5–6	22–26	18–22	24–26	12–14	28–30	5–8
c. jonesii	2–3	4	3	2	5–6–7	6	19–22	18–22	21–26	12–14	22–26	5–7
c. angolensis	?	4	?	3	?	?	?	24	27–28	14	22–29	5–7
c. rhodesianus	2¼–3	4	3	3	6	6	20–23	21–24	27–28	14	22–29	5–7
c. lawrenci	2¼	4	3	3	6	6	?	22	24	12	23	8
c. tasmani	2½–3	4	3	3	5	5	16–18	16–18	25–28	10–12	23–29	6–7
c. minor	?	4	3	3	6	5	?	24–26	27–28	16	24–26	4–6
c. cordylus	2½–4	3–4	3	3	5–6	5–6	16–20	16–20	25–29	10–14	23–30	6–9
c. niger	2	4	3	3	5	5	18–20	16–20	25–28	10–12	25–29	5–9
peersi	2–2¾	4	3–4	3	5	5	14–15	16	22–24	10–12	23–29	8–12
ukingensis	2¼	4	3	3	5	4	14	18	30	10	30	5–7
macropholis	2¼–2¾	4	3–4	3	4–5	5–6	11	14–16	16–19	10–12[6]	20–22	6–10
cataphractus	2–2½	4	3	3–4	5–6–7	5–6	17–21	20–22	15–16	17–22	24–30	12–16
pustulatus	?	4	?	3	7	6	?	27–29	30–32	14	24–25	?
namaquensis	2–2¼	4	3	3	5–6	4–5–6	16–18	24–32	31	16–18	26–30	9–10
campbelli	2¼	4	3	3	6–7	4	18	27–30	30–32	16–18	25–28	4
p. polyzonus	2¼–4	4	3	3–4	6–7	6–7	17–20	28–40	32–46	18–24	34–40	10–19
p. jordani	2½–3¼	4	3	3	5–6	5–6–7	18–20	30–35	30–40	18–22	35–40	4–8

[1] 5 *fide* Van Dam (1921a), an error due to inclusion of 2 small scales.
[2] 4 *fide* van Dam (1921a), probably due to difference in method also.
[3] 18 *fide* Sternfeld (1911b), possibly something else included in series.
[4] 24 *fide* Sternfeld (1911b), possibly something else included in series.
[5] 3 *fide* Boulenger (1896b), because it is juvenile states the author.
[6] 9 *fide* Power (1930).

Cordylus giganteus Smith

Plate 1, figs. 1–2

1844. *Cordylus giganteus* A. Smith, Ill. Zool. S. Africa, Rept., pls. xxxv-xxxvi: "Quathlamba" i.e. Drakensberg Mountains. Orange Free State.
1938. Gorham & Ivy, p. 179.
1845. *Zonurus derbianus* Gray, Cat. Lizards Brit. Mus., pp. 48, 270: South Africa.
1890a. Müller, p. 286.
1897. Bateman, p. 106.
1885e. *Zonurus giganteus* Boulenger, p. 253.
1890b. Müller, p. 699.
1893a. Boettger, p. 66.
1897. Bateman, p. 106.
1898. Sclater, p. 103.
1901. Gadow, p. 536, fig. 135.
1909a. Hewitt, p. 35.
1910b. Boulenger, p. 467.
1910. Ditmars, p. 155, pl. xxxi, fig. 2.
1910a. Hewitt, p. 60.
1911. Gilchrist, p. 230.
1911b. Hewitt, p. 47.
1913. Broom, p. 548, pl. lxxiv.
1913. Boulenger, E.G., p. 72, pl.–
1913. Hewitt & Power, p. 153.
1913a. Werner, p. 108, pl. –
1914a. Hewitt, p. 240, map.
1920. Hewitt, pp. 91, 93.
1921a. Dam, p. 242.
1925b. Flower, p. 945.
1929. Rose, p. 100.
1930. FitzSimons, V., p. 29.
1930. Power, p. 14.
1930. Schmidt, p. 153.
1932. FitzSimons, F. W., p. 212.
1935b. FitzSimons, V., p. 349.
1935. Lawrence, p. 44.
1937a. FitzSimons, V., p. 266.
1937. Lawrence, p. 109, fig.

Names. Giant Girdle-tail (English); *sonkyker* or *ouvolk* (Afrikaans).

Description. Head slightly depressed; head shields strongly rugose; rostral in contact with the frontonasal, which is longer than broad, as

long as broad, or shorter than broad; nostril pierced in the postero-inferior corner of a nasal which is not much swollen; a loreal; a preocular; median subocular not descending to the lip; fourth or fifth upper labial smallest, fifth not higher than others; prefrontals forming a suture; frontal hexagonal; postfrontals longer than broad; interparietal on a line with, and as large as, the anterior parietals, forming a suture with the postfrontals; posterior parietals much larger than the anterior; 4 large, striated, occipital spines, the inner shorter and slightly curved inwards, the outer largest and slightly curved inwards, or straight, or directed obliquely outwards, as long as, or longer than, the three anterior supraoculars; temporals large, rugose, keeled, the hindmost subtriangular, slightly curved and bluntly pointed; sides of neck with large, sharp, slightly curved or erect spines; gulars small, the anterior irregularly enlarged, the median slightly imbricate, smooth, or the lateral obtusely keeled; collar scales large, keeled, lanceolate, mucronate.

Dorsals subquadrangular, rugose, strongly keeled, sharply mucronate, the vertebral row often somewhat smaller; laterals keeled, spinose, separated by granular interspaces; ventrals subquadrangular, the median smooth and strongly imbricate, the lateral obtusely keeled and shortly mucronate; scales below both fore and hind limbs smooth; tail with whorls of large, rugose, strongly keeled but not serrate, spinose scales above and on sides, the lateral spines longest; subcaudals elongate, narrow, smooth or obtusely keeled.

For characters common to all species, [illegible] 9; for scale and pore counts, see statistical table on p. 15. In [illegible]g *giganteus* all scales are said to be more strongly imbricate and all spines less developed.

Color. Above, head dark brown, lip to ear yellow; back yellowish clouded with dark brown. Below, gular region and belly whitish or yellowish, uniform.

That of the young, according to Smith: Above, head anteriorly light yellowish brown clouded with liver brown; temples liver brown irregularly spotted with greenish white; posterior part of head, back and sides intermediate between umber and liver brown, the back, limbs, and tail irregularly barred with narrow yellow cross-bands; tail-tip orange red. Below, creamy yellow, except tail-tip which is orange red. For detailed description of a still earlier stage, and coloured plate of mother and young, see Broom (1913).

Size. Total length of a ♂ type (? *derbianus*) 382 (202 + 180) mm. (Boulenger, 1885e). Smith's measurements of 8 + 7 inches (= 204 + 179) mm., for a ♂ cotype, is rejected by FitzSimons (1937a) who

remeasured it as 351 (191 + 160) mm. Total length of a ♀, 365 (195 + 170) mm. (FitzSimons, 1937a). There is nothing to support the statement by Rose (1929) that the species attains "nearly two feet," though it appears to have been copied by later authors.

Anatomy. The so-called branchial arch is discussed by Hewitt (1920), the gall bladder by Gorham and Ivy (1938).

Longevity. Four years, six months, and nineteen days, is the longest of six records furnished by Flower (1925b).

Diet. In captivity, cockroaches, mealworms, tiny frogs, baby mice, and raw meat (Bateman, 1897).

Parasites. No mites were found on those examined by Lawrence (1935).

Defence. F. W. FitzSimons (1932) records that when a hungry mole snake (*Pseudaspis cana*) was presented with one of these spiny lizards, the serpent stalked, seized, and began to constrict it with three coils; for a time it tightened its coils, then, suddenly relaxing them, dashed away.

Similarly a captive puff adder (*Bitis arietans*), having seized a girdle-tailed lizard by the head, began to engulf it in leisurely fashion. The lizard, however, which had been quiescent up to this point, began to slew round and round and to belabour the snake so effectively with its spinous tail that the viper was glad to disgorge its prey and retire from the contest.

Habits. According to V. FitzSimons (1935b), these big lowland lizards are fairly common in the open flat country east of Kroonstad, where they may be seen sunning on small mounds or anthills. When disturbed they disappeared into burrows—apparently those of gerbils.

Its custom, when basking, of carrying its head high and facing the sun, has won for it the name of "sun-gazer" among the Dutch (Rose).

Apparently unused to water in their rocky haunts, these lizards would scuttle into a moat "swim frantically for a few seconds, then sink like a stone to the bottom," there to remain until drowned (F. W. FitzSimons, 1932).

In Europe captive girdle-tails require artificial heat of from 70° to 85° F., except during the summer months (Bateman, 1897).

Localities. **Transvaal:** Heidelberg; Paardekop Station, Standerton District; Schaapplaats, Vereeniging District; Zandspruit, Wakkerstroom District. **Orange Free State:** Bethlehem; Bloemfontein; Lower western slopes Drakensberg Mountains; Geluk Farm, 20 miles west of Kroonstad; Harrismith; Hoopstad; Kroon-

stad; Ventersburg. **Cape Province:** Colesberg (over s.w. border from Orange Free State).

Range. Southern Transvaal, Orange Free State and adjacent areas in Cape Province and Basutoland.

Cordylus warreni warreni (Boulenger)

Plate 1, fig. 3

1908b. *Zonurus warreni* Boulenger, Ann. Natal Govt. Mus., **1**, pp. 224, 232 pl. xxxv: Ubombo, Zululand.
1909a. Hewitt, p. 36.
1910b. Boulenger, p. 468.
1910a. Hewitt, p. 60.
1930. FitzSimons, p. 30.
1930. Power, p. 14.
1935. Lawrence, p. 43.
1937. Lawrence, p. 111.

Description. Head slightly depressed; head shields rugose; rostral narrowly in contact with the frontonasal, which is as long as broad; nostril pierced in the postero-inferior corner of a nasal which is not much swollen; a loreal; a preocular; median subocular descending to the lip between the third and fourth or fourth and fifth upper labials; fourth, fifth, or sixth upper labial smallest, fifth not higher than others; prefrontals forming a broad or narrow suture, or separated; postfrontals shorter than broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 6 rugose, pointed occipitals; temporals rugose, keeled, the hindmost subtriangular, slightly curved and bluntly pointed; sides of neck with large, sharp, erect spines; gulars small, the anterior irregularly enlarged, the median not imbricate, smooth, or the lateral obtusely keeled; collar scales enlarged, keeled, the lateral mucronate.

Dorsals subquadrangular, rugose, strongly keeled, lateral shortly mucronate, the two vertebral rows reduced; laterals keeled, spinose, separated by granular interspaces; ventrals quadrangular, the median smooth (in females) or obtusely keeled (in males), not, or but slightly imbricate, the lateral obtusely keeled and shortly mucronate; scales below fore limbs keeled, below hind limbs smooth or obtusely keeled; tail with whorls of large, rugose, strongly keeled but not serrate, spinose scales, alternating with whorls of smaller scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9, for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown, lip to ear yellow; back brown, flecked with black-edged, yellow spots forming more or less regular transverse series. Below, gular region whitish with brown infuscations; belly yellowish white, uniform.

Size. Total length of ♂ type, 270 (110 + 160) mm.; of a topotypic ♀ (M.C.Z. 21442), 267+ (122 + 145+) mm.

Remarks. None of the citations given above, excepting that of Lawrence, contribute to our knowledge.

Breeding. In March and November ova are small (M.C.Z. 21442, 41881).

Diet. Thirty-two *Eristalis* maggots, each about 20 mm. long, and fragments of a large snail's shell in one; millipedes and ants in another; a large grasshopper in a third (A.L.).

Parasites. Mites (*Zonurobia debilipes*) described from this species by Lawrence (1935). Nematodes (*Thubunaea sp.*, probably *T. agamae* Sandground, and Heterakidae, probably *Spinicauda* sp.), and trematodes (*Mesocoelium* sp.) were taken from topotypic lizards in the Museum of Comparative Zoölogy. I am indebted to Messrs Allen McIntosh and J. T. Lucker for making the indentifications.

Localities. **Zululand:** Ubombo.

Range. Zululand.

Cordylus warreni barbertonensis (van Dam)

1921a. *Zonurus barbertonensis* van Dam, Ann. Transvaal Mus., 7, p. 240, pl. iii: Barberton, Transvaal.
1930. FitzSimons, p. 29.
1930. Power, p. 14.
1935. Lawrence, p. 43.

Description. Head slightly depressed; head shields rugose; rostral in contact with the frontonasal, which is as long as broad, or shorter tha n broad; nostril pierced in the postero-inferior corner of a nasal which is not much swollen; a loreal; a preocular; median subocular descending to the lip between the fourth and fifth upper labials; fourth or fifth upper labial smallest, fifth not higher than others; prefrontals forming a suture; postfrontals shorter than broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 6 rugose, pointed occipitals; temporals rugose, keeled, the

hindmost subtriangular, slightly curved and bluntly pointed; sides of neck with large, sharp, erect spines; gulars small, the anterior irregularly enlarged, the median not imbricate, smooth, or the lateral obtusely keeled; collar scales enlarged, keeled, the lateral mucronate.

Dorsals subquadrangular, rugose, strongly keeled, lateral shortly mucronate, the two vertebral rows reduced; laterals keeled, spinose, separated by granular interspaces; ventrals quadrangular, the median smooth, not, or but slightly imbricate, the lateral obtusely keeled and shortly mucronate; scales below fore limbs keeled, below hind limbs smooth or obtusely keeled; tail with whorls of large, rugose, strongly keeled but not serrate, spinose scales, alternating with whorls of smaller scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9, for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown flecked with yellow, lip to ear yellow; back, blackish brown flecked with yellow spots forming more or less regular transverse series. Below, gular region whitish with brown infuscations; belly brownish variegated with yellow anteriorly and on the flanks.

Size. Total length of ♂ type, 312 (138 + 174) mm.

Remarks. Its describer states that *barbertonensis* differs from *breyeri* "in size of the occipital spines, and number of transverse series of dorsal scales." While this is correct, it will be seen from the statistical table that the latter difference is bridged by intermediate forms. There are other differences separating this, the best marked, race from *breyeri*. I proposed treating *barbertonensis* and allied forms as races of *breyeri*, but follow FitzSimons (1943) in regarding them as forms of *warreni*.

Parasites. Mites (*Zonurobia transvaalensis*) were described from this race by Lawrence.

Localities. **Transvaal:** Barberton.

Range. Transvaal (Barberton only).

Cordylus warreni perkoensis (FitzSimons)

Plate 2, fig. 1

1930. *Zonurus vandami perkoensis* FitzSimons, Ann. Transvaal Mus., 14, pp. 27, 30, figs. 8–9: Perkoe Farm, near Olifants River, eastern Transvaal.
1935. Lawrence, p. 43.

Description. Head slightly depressed; head shields posterior to ocular region rugose; rostral in contact with the frontonasal, which is

longer than broad; nostril pierced in the postero-inferior corner of a nasal which is not much swollen; a loreal; a preocular; median suboocular descending to the lip between the fourth and fifth upper labials; fifth upper labial smallest, fifth not higher than others; prefrontals forming a suture; postfrontals shorter than broad; interparietal enclosed between 2 pairs of parietals or largely on a line with the anterior parietals, forming, or nearly forming, a suture with the postfrontals; posterior parietals slightly larger than the anterior; 4–5 rugose, pointed occipitals; temporals rugose, keeled, the hindmost subtriangular, slightly curved and bluntly pointed; sides of neck with large, sharp, erect spines; gulars small, the anterior irregularly enlarged, the median not imbricate, smooth collar scales not enlarged mesially, faintly keeled, the lateral keeled and mucronate.

Dorsals subquadrangular to subcircular, finely rugose, strongly keeled, lateral shortly mucronate, the two vertebral rows reduced; laterals keeled, spinose, separated by granular interspaces; ventrals quadrangular, the median smooth, not or but slightly imbricate, the lateral keeled and mucronate, the 2–3 outermost rows much smaller and almost spinose; scales below forelimbs keeled and mucronate, below thigh obtusely keeled and shortly mucronate, below tibia strongly keeled and mucronate; tail with whorls of large, rugose, strongly keeled but not serrate spinose scales, alternating with whorls of smaller scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9, for scale and pore counts, see statistical table on p. 15.

Color. Above, head and back dark brown, uniform except for a few isolated yellow flecks on flanks and tail. Below, gular region yellowish white with brown infuscations; belly mummy brown, uniform except for a series of short, irregular, transverse bars of yellow at sides and some traces of same on limbs; tail with a few scattered flecks of yellowish white.

Size. Total length of ♀ type, 276 (126 + 150) mm.

Remarks. Known only from two females. Its describer states that *perkoensis* differs from *vandami* as follows: "head wider and deeper (as clearly shown in the figures); greater arching of the supraoccipital ridge; well marked suborbital ridge; short contact of the prefrontals; colouring on the whole more uniform." As I have seen neither of the types, I can only add that the grounds for separation appear slender. FitzSimons (1943) continues to regard *perkoensis* as a race of *vandami*.

Breeding. During first week in November (late spring) both females

held eggs, those in the paratype in an early stage, those in the type containing well-formed embryos curled about the yolk.

Parasites. Mites (*Zonurobia transvaalensis*) were described from this race by Lawrence.

Temperament. Gravid females were excessively shy, which, in conjunction with the inacessibility of their retreats, made them difficult to capture.

Habitat. Living at an altitude of about 5000 feet among huge rock masses which had broken away from the slopes above.

Localities. **Transvaal:** Perkoe Farm near Olifants River.

Range. Transvaal (Eastern only).

Cordylus warreni vandami (FitzSimons)

1930. *Zonurus vandami* FitzSimons, Ann. Transvaal Mus., **14**, pp. 25, 30, figs. 6–7: Gravelotte, near Leydsdorp, eastern Transvaal.
1935. Lawrence, p. 43.

Description. Head slightly depressed; head shields rugose; rostral in contact with the frontonasal, which is longer than broad or as long as broad; nostril pierced in the postero-inferior corner of a nasal which is not much swollen; a loreal; a preocular; median subocular descending to the lip between the third and fourth or fourth and fifth upper labials; fourth or fifth upper labial smallest, fifth not higher than others; prefrontals forming a suture; postfrontals longer than broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 4–8 rugose, pointed occipitals; temporals rugose, keeled, the hindmost subtriangular, slightly curved and bluntly pointed; sides of neck with large, sharp, erect spines; gulars small, the anterior irregularly enlarged, the median not imbricate, smooth, or the lateral obtusely keeled; collar scales enlarged, keeled, the lateral mucronate.

Dorsals subquadrangular, rugose, strongly keeled, lateral shortly mucronate, the two vertebral rows reduced; laterals keeled, spinose, separated by granular interspaces; ventrals quadrangular, not, or but slightly imbricate, the lateral obtusely keeled but not shortly mucronate; scales below fore limbs keeled, below hind limbs smooth or obtusely keeled; tail with whorls of large, rugose, strongly keeled but not serrate, spinose scales, alternating with whorls of smaller scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9, for scale and pore counts, see statistical table on p. 15.

Color. Above, head and back dark brown to sepia, a yellow, irregular, transverse bar on nape, four others on body, one at root of tail; similar yellow barring on limbs and tail. Below, yellowish with brown infuscations; tail broadly banded with yellow.

Size. Total length of ♂ paratype (T.M. 7410), 273 (155 + 118) mm.; of type ♀ (T.M. 7407), 287 (155 + 132) mm.

Remarks. Its describer states that *vandami* differs from *barbertonensis* by its slightly narrower and more depressed head, greater rugosity of head shields, and 4 occipitals. The paratype series of 8 lizards, however, was comprised of individuals with 4, 5, 6 (M.C.Z. 41876), and even 8 occipitals, the last, as pointed out by FitzSimons, resulting from the subdivision of the original 4, this character, therefore, cannot be considered of diagnostic value, though used as a key character by FitzSimons (1943) who continues to regard it as a full species. In so large a lizard the alleged difference of 25 mm. in size can not have much significance.

Parasites. Mites (*Zonurobia transvaalensis*) were described from this race by Lawrence.

Habitat. Occurs between 4000 and 5000 feet on the northeastern spur of the Drakensberg.

Localities. **Transvaal:** Leydsdorp District: Gravelotte; Malta; Skelem.

Range. Transvaal (Drakensberg Mountains).

Cordylus warreni depressus (FitzSimons)

1930. *Zonurus barbertonensis depressus* FitzSimons, Ann. Transvaal Mus., **14**, pp. 24, 29: Newgate Farm, near Louis Trichardt, Zoutpansberg Mountains, northern Transvaal.

1935. Lawrence, p. 43.

Description. Head slightly depressed; head shields rugose; rostral in contact with the frontonasal, which is longer than broad; nostril pierced in the postero-inferior corner of a nasal which is not much swollen; a loreal; a preocular; median subocular descending to the lip between the fourth and fifth upper labials; fifth upper labial smallest, fifth not higher than others; prefrontals forming a suture; postfrontals longer than broad; interparietal on a line with the anterior parietals, forming a suture with the postfrontals; posterior parietals slightly larger than the anterior; 6 rugose, pointed occipitals; temporals rugose, keeled, the hindmost subtriangular, slightly curved and bluntly

pointed; sides of neck with large, sharp, erect spines; gulars small, the anterior irregularly enlarged, the median not imbricate, smooth, or the lateral obtusely keeled; collar scales enlarged, keeled, the lateral mucronate.

Dorsals subquadrangular, rugose, strongly keeled, lateral scarcely mucronate, the two vertebral rows reduced; laterals keeled, spinose, separated by granular interspaces; ventrals quadrangular, smooth, not or but slightly imbricate, the lateral obtusely keeled but not shortly mucronate; scales below fore limbs keeled, below hind limbs smooth or obtusely keeled; tail with whorls of large, rugose, strongly keeled but not serrate, spinose scales, alternating with whorls of smaller scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9, for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown flecked with yellow; back brown with yellow spots forming more or less regular transverse series. Below, yellowish with brown infuscations.

Size. Total length of ♀ paratype (M.C.Z. 41869), 250+ (120 + 130+) mm. Both paratype ♂ and type ♀ had the same body length but the tails in all six of the type series were damaged.

Remarks. Its describer states that *depressus* differs from *barbertonensis* in having the "head considerably more depressed and rugose: occipital spines not so elongate and subequal: dorsal scales larger and more rugose: lateral spines on tail shorter and sturdier, directed outwards at greater angle: scales on palms of hands and soles of feet larger and thus fewer in number."

I must confess that, having compared our aged and worn paratype of *depressus* with a topotype of *barbertonensis*, the only differences that I can detect are those affecting the dorsals and possibly some slight difference in scales on "palms" and soles.

Breeding. Early in July (midwinter) three of the four females held eggs, the oviduct of one containing "two large undeveloped eggs." (FitzSimons).

Diet. All were emaciated, probably due to being taken in midwinter.

Parasites. Mites (*Zonurobia transvaalensis*) were described from this race by Lawrence.

Habitat. Occurs between 4800 to 5000 feet on the Zoutpansberg, in or near rock crevices caused by weathering.

Localities. **Transvaal:** Newgate Farm near Louis Trichardt.

Range. Transvaal (Zoutpansberg Mountains).

Cordylus warreni laevigatus (FitzSimons)

Plate 2, fig. 2

1933. *Zonurus laevigatus* FitzSimons, Ann. Transvaal Mus., **15**, p. 276, figs. 1–2: Entabeni, Zoutpansberg Mountains, northern Transvaal.
1935. Lawrence, p. 43.

Description. Head slightly depressed; head shields slightly rugose; rostral in contact with the frontonasal, which is as long as broad; nostril pierced in the postero-inferior corner of a nasal which is not much swollen; a loreal; a preocular; median subocular descending to the lip between the fourth and fifth upper labials; fifth upper labial smallest and not higher than others; prefrontals forming a suture; postfrontals longer than broad; interparietal on a line with the anterior parietals, forming a suture with the postfrontals; posterior parietals much larger than the anterior; 6 rugose, pointed occipitals; temporals rugose, keeled, the hindmost subtriangular, slightly curved and bluntly pointed; sides of neck with a few large, sharp, erect spines; gulars small, the anterior irregularly enlarged, the median not imbricate, smooth, or the lateral almost imperceptibly keeled; median collar scales enlarged, smooth, the lateral keeled, mucronate.

Dorsals subquadrangular, finely rugose, keeled, the two vertebral rows reduced; laterals keeled, spinose, separated by granular interspaces; ventrals quadrangular, the median smooth, not imbricate, the lateral obtusely keeled and shortly mucronate; scales below fore limbs keeled, below thigh smooth, below tibia, obtusely keeled and mucronate; tail with whorls of large, rugose, strongly keeled but not serrate, spinose scales, alternating with whorls of smaller scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9, for scale and pore counts, see statistical table on p. 15.

Color. Above, head and body dark brown sparsely spotted with yellow. Below, slightly paler, gular region with darker infuscations.

Size. Total length of ♀ type (T.M. 14229) 226 (116 + 110) mm.

Remarks. Its describer states that *laevigatus* may be readily distinguished from *barbertonensis*, *vandami*, and *breyeri* by "its much slighter build and pronounced reduction of the rugosity and spinosity of the scales generally." Having seen neither of the females on which this form was based, I can only add that the grounds of separation appear slender. FitzSimons (1943) continues to regard it as a full species.

Parasites. Mites (*Zonurobia transvaalensis*) were described from this race by Lawrence.

Habitat. Occurs between 5000 and 6000 feet on the Zoutpansberg, beneath loose stones and in rock crevices.

Localities. **Transvaal:** Entabeni.

Range. Transvaal (Zoutpansberg Mountains).

Cordylus warreni breyeri (van Dam)

Plate 2, fig. 3

1921a. *Zonurus breyeri* van Dam, Ann. Transvaal Mus., **7**, p. 239, pls. i-ii: Geelhoutkop Farm, about 45 miles north of Nylstroom, Waterberg District, northwestern Transvaal.
1930. FitzSimons, p. 29.
1930. Power, p. 14.
1935. Lawrence, p. 44.
1937. Lawrence, p. 111.

Description. Head slightly depressed; head shields rugose; rostral in contact with the frontonasal, which is as long as broad; nostril pierced in the postero-inferior corner of a nasal which is not much swollen; a loreal; a preocular; median subocular descending to the lip between the fourth and fifth upper labials; fifth upper labial smallest, fifth not higher than others; prefrontals forming a suture; postfrontals about as long as broad; interparietal on a line with the anterior parietals, forming a suture with, or separated from, the postfrontals; posterior parietals slightly larger than the anterior; 6 rugose, pointed occipitals; temporals rugose, keeled, the hindmost subtriangular, slightly curved and bluntly pointed; sides of neck with large, sharp, erect spines; gulars small, the anterior irregularly enlarged, the median not imbricate, smooth, or the lateral obtusely keeled; collar scales enlarged, the lateral keeled and mucronate.

Dorsals subquadrangular, rugose, strongly keeled, lateral shortly mucronate, the two vertebral rows reduced; laterals keeled, spinose, separated by granular interspaces; ventrals quadrangular, the median smooth, not or but slightly imbricate, the lateral obtusely keeled but not imbricate; scales below fore limbs keeled, below thigh smooth or obtusely keeled, below tibia, keeled; tail with whorls of large, rugose, strongly keeled but not serrate spinose scales, alternating with whorls of smaller scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9, for scale and pore counts, see statistical table on p. 15.

Color. Above, head brownish black; back brown; flanks yellowish brown; tail grayish brown. Below, slate gray; tail slightly lighter than above.

Size. Total length of ♀ type (T.M. 3769), 275 (120 + 115) mm.

Remarks. Its describer contrasted *breyeri* with *giganteus* from which it differs greatly in many respects, specifically in the presence of alternating whorls of smaller scales on the tail in the entire *warreni* group.

The typical form is known only from the adult type, three subadult lizards, and six foetal young. The latter (*circa* 90 mm.) are said to differ from the adult in the head shields being smooth; occipitals only keeled, not sharply pointed; median as well as lateral dorsals strongly keeled; smaller whorls of caudal scales distinctly visible from above, but not on the sides and below where they are hidden by the spines.

Breeding. In January the gravid type was found to contain 6 young, the largest measuring 90 mm.

Parasites. Mites (*Zonurobia circularis latior*) were described from this race by Lawrence.

Habitat. Occurs at about 5000 feet in Waterberg District, among rocks.

Localities. **Transvaal:** Geelhoutkop Farm.

Range. Transvaal (Waterberg Mountains).

Cordylus caeruleopunctatus (Methuen & Hewitt)

Plate 3, fig. 3

1913c. *Zonurus caeruleopunctatus* Methuen & Hewitt, Trans. Roy. Soc. S. Africa, **3**, p. 110: Buffel's Nek, between Knysna and Avontuur, Cape Province.
1914a. Hewitt, p. 239.
1925. Essex, p. 339.
1928a. Essex (1927), p. 932.
1930. FitzSimons, p. 29.
1930. Power, p. 13, pl. ii, fig. 2.
1935. Lawrence, p. 44.
1937. Lawrence, pp. 109, 111.

Description. Head slightly depressed; head shields smooth anteriorly, slightly rugose posteriorly; rostral in contact with, or separated from, the frontonasal, which is shorter than broad; nostril pierced in the lower centre of a nasal which is not much swollen; a loreal; a

preocular; median subocular descending to the lip between the fourth and fifth upper labials; fourth upper labial lowest, fifth higher than others except first; prefrontals forming a suture, or separated; postfrontals as long as broad; interparietal enclosed between 2 pairs of parietals; posterior parietals much larger than the anterior; *no occipitals*; anterior nuchals very small; temporals large, rugose, keeled, without spines; sides of neck with keeled scales; gulars moderate, the anterior irregularly enlarged, the median not imbricate, smooth; collar scales larger but undifferentiated.

Dorsals elongate, strongly keeled, a few shortly mucronate, posteriorly serrate, the two vertebral series enlarged; laterals elongate, keeled; ventrals quadrangular, smooth, not or but slightly imbricate; scales below fore limbs keeled, below hind limbs smooth or obtusely keeled; tail with whorls of large, strongly keeled, slightly mucronate and serrate scales above and below, the subcaudals being long, narrow, pentagonal, keeled.

For characters common to all species, see definition on p. 9, for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown; back blackish brown variegated anteriorly with irregular, longitudinal, fawn-colored stripes; sides of head and flanks flecked with bright blue. Below, gular region orange (white in alcohol); belly greenish white to bluish; tail brownish.

Size. Total length of type (T.M. 1920) 150^{+} ($65 + 85^{+}$) mm., of another (from Power Siding) 182 ($72 + 110$) mm.

Remarks. The describers suggest that this lizard is related to *warreni* and *capensis* (now in *Pseudocordylus*). Power (1930) thinks to *cordylus*. It differs from all other members of the genus in lacking *occipitals* and in the greatly reduced nuchals, both characters apparently demonstrating affinities with *Pseudocordylus* with which it also agrees in lacking osteoderms.

Parasites. Mites (*Ixodiderma inverta* and *Zonurobia sanguinea*) were found by Lawrence.

Temperament. When basking in the sun this lizard is extremely difficult to catch. Of thirty lizards counted on a mile-long wall only three were captured (Essex). Its eyesight appears abnormally keen making it difficult to approach even within shooting distance of one of these lizards (Lawrence).

Habitat. Among rocks on a mountain within the Cape Flora vegetational zone, no forest being present.

Localities. **Cape Province:** Buffel's Nek between Avontuur and Knysna; Montagu Pass, Outeniqua Mountains; Power Siding,

halfway up Montagu Pass; Prince Alfred's Pass, Outeniqua Mountains; Silver River between George and the Wilderness.

Range. Cape Province (Outeniqua Mountains and vicinity).

Cordylus vittifer (Reichenow)

1887. *Zonurus vittifer* Reichenow, Zool. Anz., **10**, p. 372: Transvaal.
1891a. Matschie, p. 606.
1894c. Boulenger, p. 724.
1898. Sclater, p. 104.
1908b. Boulenger, p. 224.
1909a. Hewitt, pp. 31, 37.
1910a. Hewitt, p. 56.
1911b. Hewitt, p. 74.
1911b. Sternfeld, p. 401.
1911c. Sternfeld, p. 419.
1911d. Sternfeld, p. 21, fig. 20.
1914a. Hewitt, p. 239.
1921a. Dam, p. 242.
1927c. Power, p. 407.
1930. FitzSimons, p. 30.
1935. Broom, p. 20, fig. 5b.
1935. Lawrence, p. 44.
1889. *Zonurus cordylus* Boettger (not Linné), p. 287.
1910b. Boulenger (part), p. 468.
1907b. *Zonurus cordylus* var. *vittifer* Roux, p. 418.
1908. Odhner, p. 3.
1930. Power, p. 17.
1931. Power, pp. 41, 48. (as *vettifer* also).
1910b. *Zonurus tropidogaster* Boulenger, Ann. S. African Mus., **5**, pp. 468, 495: Barberton, Transvaal.
1911b. Hewitt, p. 47.
1930. Power, p. 15.

Further citations of "*vittifer*" will be found under *cordylus angolensis* and *c. tropidosternum*.

Description. Head much depressed; all head shields strongly rugose; rostral separated from the frontonasal, which is longer than broad, as long as broad, or sometimes absent[1]; nostril pierced in the postero-inferior corner of a large nasal which is not much swollen; a loreal present or absent[2]; a preocular; the median subocular not descending to the lip; fourth upper labial lowest, fifth highest; prefrontals forming

[1] In type of *tropidogaster* only.
[2] For example fused with preocular in M.C.Z. 41879-80.

a suture, or separated; postfrontals longer than broad, as long as broad, or shorter than broad; interparietal enclosed between 2 pairs of parietals or on a line with the anterior parietals separated from or forming a suture with the postfrontals; posterior parietals much larger than the anterior; 4–6 rugose, subequal occipitals; anterior row of nuchals *twice as large as the second;* temporals large, rugose, slightly keeled, without spines; sides of neck with keeled, spinose scales; gulars small, the anterior irregularly enlarged, the median slightly imbricate, smooth, or the laterals only obtusely keeled and even mucronate[1]; collar scales larger but undifferentiated.

Dorsals elongate, rugose, keeled, very shortly mucronate, not or but slightly serrate, those on the vertebral line not or but rarely differentiated; laterals keeled, serrate, spinose; ventrals quadrangular, smooth or keeled[2], not or but slightly imbricate; scales below fore limbs keeled, below hind limbs smooth or slightly keeled; tail with whorls of large, strongly striate, keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown; back yellowish, yellowish brown, reddish brown, uniform or variegated or spotted with darker, a yellow vertebral line present or absent. Below, whitish, uniform. Color of young richer than that of adults.

Size. Total length of largest ♂ (M.C.Z. 12416) 172+ (83 + 89+) mm. (ex. Rhoodeplaat); and largest ♀ (M.C.Z. 21364) 160+ (82+78+) mm. (ex. Doornkop). The type (Berlin Mus.) was only 112 (55 + 57) mm., while the type of *tropidogaster* (Brit. Mus.?) was still smaller, having a length from snout to anus of only 48 mm.

Remarks. Z. tropidogaster Boulenger was based on a young lizard which lacked a frontonasal and possessed keeled ventrals. The latter condition has long been known to occur in occasional specimens of *vittifer* (Roux, 1907b) and such as a specimen from Zululand (M.C.Z. 45416) or Marieskop, Transvaal (M.C.Z. 41877), so that I entirely concur with Hewitt's (1911b, p. 147) suggestion that it is nothing but a synonym of *vittifer.* Such a view is reinforced by the occurrence of typical *vittifer* at Barberton, type locality of *tropidogaster.*

Tornier (1896), impressed by the similarities between *vittifer* and *cordylus* synonymized the former with the latter. Roux (1907b) on account of stable differences revived it as a variety. Hewitt (1909a)

[1] In M.C.Z. 41877.
[2] See *Remarks.*

rightly restored it to full specific rank on account of the constantly longer nasal suture, greatly enlarged first row of nuchals, and more numerous dorsals.

With regard to the latter, it is clear from the context that Roux's (1907b) counts of longitudinal dorsal rows *do not* include the laterals, whereas Sternfeld (1911b), in common with most recent authors, *does* include them. Had this been realized much unnecessary discussion might have been avoided. Monard's (1937b) suggestion that the Angolan *cordylus* of Bocage are referable to *vittifer* is untenable.

Anatomy. Broom (1935) discusses the temporal region of the skull.

Parasites. Mites (*Zonurobia circularis latior*) have been described from this species by Lawrence.

Habitat. Living under stones and in rocky crevices of kopjes (van Dam) chiefly in the low veld portions of the Transvaal (Hewitt), and one found at a height of four feet from the ground in a small tree at Lobatsi (Power).

Localities. **Bechuanaland:** Lobatsi (*fide* Power). **Transvaal:** Arnhemburg; Barberton; Belfast; Botschabelo near Middleburg; Carolina; Doornkop near Belfast; Entabeni; Frederikstad; Haenertsburg; Johannesburg; Koster; Krugersdorp; Linokana; Makapan; Marico; Mariepskop; Metlepetsi River; Middleburg District; Mphome (Mpoma), Zoutpansberg; Olifants River District; Orange Grove near Johannesburg; Pietersburg; Potgietersrust; Pretoria District; Roodeplaat; Rustenburg District; Selati; Shilowane; Wakkerstroom; Waterberg; Witwatersrand; Woodbush. **Zululand:** Mkusi River; Ubombo; Umfolosi Rivers junction. **Natal:** Ladysmith; Reitvlei, Umvoti; Weenen.

Range. Transvaal and adjacent areas in Bechuanaland, Swaziland, Zululand, and Natal. (Power (1930) includes: "Albany Division, Cape Province." It would seem probable that this was based on Hewitt's (1909a) record from Teafontein, near Grahamstown; a record which was later repudiated by Hewitt (1911b). Angola, based on Monard's suggestion, (*vide* Remarks *supra*), is also rejected.

Cordylus cordylus rivae (Boulenger)

1896b. *Zonurus rivae* Boulenger, 1897, Ann. Mus. Civ. Stor. Nat. Genova (2), **17**, p. 8: Giacorsa, Gallaland, Ethiopia.

1897g. Boulenger, p. 278.

Description. Head longer than broad; rostral separated from the frontonasal, which is longer than broad, nostril pierced in the "centre"

of a nasal which is not much swollen; a loreal; a preocular; prefrontals separated by frontonasal forming a suture with the frontal; temporals large, without spines; gulars small, keeled.

Dorsals strongly keeled, shortly mucronate; median ventrals smooth; the lateral obtusely keeled; preanals subequal (!); tails with whorls of large, strongly keeled, spinose scales above and below.

This scanty description is adapted from the original which might be consulted for further details; for scale and pore counts see statistical table on p. 15.

Color. Above, reddish brown, darker brown along the middle of the back and on the sides. Below, reddish brown.

Size. Total length of young holotype, 79 (39 + 40) mm. Length of head 13 mm.; width of head 10 mm.; length of body 26 mm.; of fore limb 15 mm.; of hind limb 19 mm.

Localities. **Ethiopia**: Gallaland: Giacorsa.

Range. Ethiopia (known only from the type locality).

Cordylus cordylus tropidosternum (Cope)

Plate 3, figs. 2a-b

1869. *Zonurus tropidosternum* Cope, Proc. Amer. Philos. Soc., **11**, p. 169: "Madagascar" (presumed error for Mozambique).
1881c. Boettger, p. 528.
1885e. Boulenger, p. 254.
1896. Tornier, p. 31.
1897. Tornier, p. 64.
1898. Tornier, p. 285.
1900b. Tornier, p. 590.
1909. Mocquard, p. 4.
1913. Boettger, pp. 360, 361.
1913c. Nieden, p. 71.
1920a. Loveridge, p. 143.
1923d. Loveridge, p. 849.
1923h. Loveridge, p. 947.
1924b. Loveridge, p. 10.
1928. Cott, p. 953.
1936j. Loveridge, p. 296.
1937f. Loveridge, pp. 492, 495.
1939b. FitzSimons, p. 29.
1942e. Loveridge, p. 330.
1889. *Zonurus frenatus* Pfeffer, Jahrb. Hamburg, Wiss. Anst. **6**, p. 6: Mhonda, Tanganyika Territory.
1893. Pfeffer, p. 73, pl. i, figs. 1–2.

1896. *Zonurus* spec. ? *cordylus*, ? *vittifer* Tornier, p. 35 (Potuë).
1897. Tornier, p. 64.
1897e. *Zonurus cordylus* Boulenger (not Linné), p. 800 (Nyasaland).
1898. Tornier, p. 285, fig. 4.
1898. Johnston, p. 361.
1902b. Tornier, p. 590.
1934. Pitman, p. 304.
1934a. *Zonurus parkeri* Cott, Proc. Zool. Soc. London, p. 151, pl. ii: Amatongas, Mozambique.
1937d. *Cordylus tropidosternum* Mertens, p. 5.

Names. Eastern Girdle-tail (English); *kiumambusi* (Swahili: Tornier); *chicologolo* (Mwera: Loveridge).

Description. Head slightly depressed; head shields strongly rugose; rostral in contact with, or separated from, the frontonasal, which is longer than broad; nostril pierced in the postero-inferior corner of a large nasal which is not much swollen; a loreal; a preocular; the larger subocular not descending to the lip; fourth upper labial lowest, fifth highest; prefrontals forming a suture or separated; postfrontals longer than broad or as long as broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 3–4 rugose, subequal occipitals; temporals rugose, with or without keels, without spines; sides of neck with keeled, spinose scales; gulars small, the anterior irregularly enlarged, the median slightly imbricate, keeled; collar scales larger, sometimes mucronate.

Dorsals slightly elongate, rugose, strongly keeled, shortly mucronate, posteriorly serrate, those on the vertebral line not or but slightly differentiated; laterals keeled, spinose, scarcely separated by minute granular interspaces; ventrals quadrangular, smooth or keeled, not or but slightly imbricate; scales below fore and hind limbs slightly keeled; tail with whorls of large, strongly striate, keeled, serrate (in adults, but noticeably in young), spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head dark brown, lip to ear usually yellow; back yellowish, yellowish brown, reddish brown, grayish brown, blackish brown or rich brown, uniform or clouded, variegated, or spotted with darker; a broad blackish streak on side of neck from above tympanum to forearm, sometimes persisting as a distinct (Rhodesia) or ill-defined (Tanganyika) lateral band. Below, uniform greenish, grayish, yellowish, or reddish (stained by laterite soil) white.

Size. Total length of ♂, 180 (90 + 90) mm., and ♀, 170 (95 + 75) mm., both from Morogoro. The head and body length of the types are: 92 mm. (*tropidosternum*), 70 mm. (*frenatus*), and 92 mm. (*parkeri*), the tails being damaged in the two largest.

Remarks. The type, formerly Museum of the Essex Institute No. 500, now Mus. Comp. Zoöl. 5742, is apparently a ♂ but it is somewhat macerated and the viscera have been removed. Mocquard (1909, p. 4) was correct in eliminating *tropidosternum* from the Malagasy herpetofauna. Hewitt (1910a) also discusses the matter, but takes a contrary view. If actually taken on the island, its presence may be readily explained by the extensive dhow trade across the Mozambique channel, this species being subject to transportation in hollow logs which have been cut for fuel.

In this connection it is interesting to note that Cope's type bears a closer resemblance to the series from Birchenough Bridge, Southern Rhodesia, than it does to Tanganyika lizards. I have spent much time in endeavouring to find other than color characters by which to separate the Tanganyika lizards (for which the name *frenatus* would be available), but the differences appear too slight to justify such action. I might say, however, that *parkeri* of Mozambique, which allegedly differed from *tropidosternum*, is definitely a synonym of that race. Elsewhere I (1936j) have discussed in detail the relative lengths of fingers and toes and other variable characters employed by Cott for the separation.

In Cott's paratype of *parkeri*, though not in the type, and in five of the eight specimens taken at Birchenough Bridge by FitzSimons, the prefrontals were separated by the frontonasal being in contact with the frontal. Tornier's (1896) error of dividing Tanganyika material on the basis of rostral being in contact with, or separated from, the frontonasal by a suture of the nasals, was later corrected by Nieden (1913c). More recently Mertens (1937d) has invited attention to minor differences exhibited by his six lizards from Matete Woods.

Breeding. On July 28, at Makindu, I took a ♀ which held 4 large eggs. Tornier found 5 embryos in a ♀, apparently from Dar es Salaam but without date.

Diet. Each of four stomachs examined held termites, a glowworm fell from the mouth of a fifth, while a captive lizard fed readily on small grasshoppers.

Parasites. The nematode worm (*Oochoristica zonuri*) described as from this species, actually came from a *Gerrhosaurus m. major*, the error in labeling it in 1918 was mine.

Enemies. Their spines do not offer perfect protection for I recovered one from the stomach of a Bare-faced Hawk (*Gymnogenys t. typicus*), while another was caught and eaten by a young galago (*Galago c. panganiensis*) which had been temporarily put in the vivarium.

Habitat. Coastal zone and upland savanna, where they are found upon hollow trees into whose interiors they retreat and from which it is difficult to dislodge them. One was actually brought into camp in a hollow log—in which she had remained while it was being chopped down—and did not even show herself when the log was roughly flung down. Three were taken from holes in the base of a wall. Two others, after torrential downpours, were found in roadside gutters in a half-drowned condition, having evidently been washed out of some retreat. One was caught running over papers on the table in my tent. In East Africa the species may generally be considered scarce except perhaps at Morogoro where eleven were taken during a year.

FitzSimons (1939b), who took eight specimens at Birchenough Bridge, found them living in the rotted-out cavities of mopane trees.

Localities. **Kenya Colony:** Sokoki Forest. **Tanganyika Territory:** Dar es Salaam; Kakoma; Kipera; Makindu, Msiha River; Matete; Mhonda; Morogoro; Msimba; Nchingidi, Rondo Plateau; Pentambili; Potuë, Usambara district; Rufigi; Tendaguru; Unyika; Usaramo. **Mozambique:** Amatongas. **Nyasaland. Southern Rhodesia:** Birchenough Bridge.

Range. Kenya Colony (near Malindi) south through Tanganyika, Mozambique, and Nyasaland to Southern Rhodesia (where it meets with *C. c. jonesii* and *C. c. rhodesianus*).

Cordylus cordylus jonesii (Boulenger)

Plate 3, fig. 3

1891d. *Zonurus Jonesii* Boulenger, Ann. Mag. Nat. Hist. (6) **7**, p. 417: Murchison Range, northeast Transvaal.
1894e. Boulenger, p. 724.
1895. Jeude, p. 228 (as *Johnesii*).
1898. Sclater, p. 103.
1907j. Boulenger, p. 484.
1907b. Roux, p. 420.
1909b. Chubb, p. 35.
1909a. Hewitt (part), pp. 31, 36 (omit Steynsburg and Vitenhage).
1910b. Boulenger, p. 468.
1910a. Hewitt, pp. 56, 60.

1911b. Hewitt, p. 47.
1913. Hewitt & Power, p. 153.
1914a. Hewitt, p. 239.
1921a. Dam, p. 243.
1927c. Power, p. 407.
1930. FitzSimons, p. 29.
1934. Pitman, p. 304.
1935. Lawrence, p. 44.
1892a. *Zonurus cordylus* Boulenger (not Linné), p. 174.
1909a. Chubb, p. 593.
1930. *Zonurus cordylus jonesii* Power, p. 16, pl. i, fig. 3.
1931. Power, p. 48.
1933a. Hewitt, p. 48.
1935b. FitzSimons, p. 349.

Description. Head slightly depressed; all head shields strongly rugose; rostral rarely in contact with, usually separated from, the frontonasal, which is longer than broad or as long as broad; nostril pierced in the lower center of a large nasal which is not much swollen; a loreal present or absent; a preocular; the larger subocular not descending to the lip; third or fourth upper labial lowest, fourth or fifth highest; prefrontals forming a suture or separated; postfrontals longer than broad or as long as broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 4 rugose, subequal occipitals; temporals rugose, without keels or spines; sides of neck with keeled, spinose scales; gulars small, the anterior irregularly enlarged, the median slightly imbricate, smooth or feebly keeled; collar scales larger but undifferentiated.

Dorsals slightly elongate, rugose, strongly keeled, shortly mucronate, posteriorly serrate, those on the vertebral line not or but rarely differentiated; laterals keeled, spinose; ventrals quadrangular, smooth, not or but slightly imbricate; scales below fore limbs keeled, below hind limbs smooth; tail with whorls of large, strongly striate, keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown, lip to ear yellow; back yellowish brown, olive brown, or reddish brown, uniform or spotted with darker; from tympanum to groin a black, brown, or reddish lateral band. Below, whitish, uniform.

Size. Total length of ♂ type (Brit. Mus.) 118+ (67 + 51+) mm.; a perfect ♂ (M.C.Z. 14212), 124 (70 + 54) mm.; length from snout to

anus of largest ♂ (FitzSimons) and ♀ (M.C.Z. 20990), 73 mm., both having lost their tail tips.

Remarks. Hewitt (1909a), furnishing actual measurements, shows that the heads of adult *c. jonesii* are much less depressed than those of *c. cordylus*, but adds that the distinction is not so obvious in young individuals. In *c. jonesii* the head shields are strikingly rugose in comparison with the much smoother ones of *c. cordylus*.

Hewitt's (1933a) suggestion, however, that Bulawayo lizards should probably be referred to *c. rhodesianus*, is not approved by FitzSimons (1935b) nor confirmed by our single Bulawayo specimen.

Parasites. Mites (*Zonurobia circularis* var.) were found by Lawrence.

Habitat. Found among the cracks and crevices of dolomite kopjes (Power). Beneath the bark of a dead tree and within the hollow trunk of a living one (van Dam). Under loose bark of tree growing in Kalahari sand veld; among dead wood of mopane forest; on a fence in the middle of Bulawayo (FitzSimons).

Localities. **Mozambique:** Mozambo, Limpopo River. **Southern Rhodesia:** Bulawayo; Empandeni; Lundi River; Matopo Hills. **Bechuanaland:** Devondale; Kuke to Molepole; Lobatsi; Mmoove 42 miles from Serowe; Palapye; Titumi (Totomi) near Bushman Mine. **Transvaal**[1]: Bridgewater; Crocodile-Komati River junction; Geelhoutkop; Griffin Mine near Leydsdorp; Haenertsburg; Hectorspruit; Hornsnek; Leydsdorp; Limpopo River; Louis Trichardt; Lydenburg; Magalakwin River; Maiepo *c.* 25 miles N. of Gravelotte; Makoetsi River; Murchison Range; Olifants River District; Pongola River; Potgietersrust; Pretoria District; Rustenburg; Selati; Shiny *c.* 28 miles E. of Gravelotte; Silwane; Waterberg District; Wilhanshohe; Zoutpansberg District. **Cape Province:** Kimberly (introduced).

Range. Southern Mozambique and Southern Rhodesia (Bulawayo south) and Bechuanaland (eastern Kalahari) through Transvaal. Also Cape Province (at Kimberly where it has been artificially introduced).

Cordylus cordylus angolensis (Bocage)

?1869b. *Zonurus griseus* Peters (not Cuvier), p. 659 (Damaraland).
?1885e. *Zonurus cordylus* Boulenger (part, not Linné), p. 256 (Damaraland).
?1895a. Bocage, p. 24 and footnote p. 25 (Angola).

[1] Specimens from Johannesburg and Krugersdorp listed under *cordylus* by Boulenger (1910b), are all *vittifer* according to FitzSimons (letter of March, 1943).

?1897b. Boulenger, p. 277 (Aruwimi, Belgian Congo).
?1911d. Sternfeld, p. 21 (Damaraland).
1895a. *Zonurus angolensis* Bocage, Herp. Angola et Congo, p. 25: Caconda, Angola.
1930. Power, p. 16.
1937b. Monard, p. 61.
?1937b. *Zonurus vittifer* Monard (not Reichenow), p. 61.

Description. Nostril pierced in the postero-inferior corner of a nasal which is not much swollen; a loreal; a preocular; prefrontals forming a suture or separated; gulars noticeably smaller than those of *cordylus*, imbricate, smooth or keeled.

For scale and pore counts see statistical table on p. 15.

Color. Above, head and back brown, a double series of small, irregular, whitish spots along the back; tail barred with brown. Below, whitish with darker infuscations.

Size. Total length of ♂ type, 152+ (74 + 78+) mm.

Remarks. This form is known to me only from Bocage's description, based on characters which are variable in typical *cordylus*; in a footnote Bocage adds that he has two other Angolan specimens lacking precise locality, which he considers are quite typical *cordylus*. The scanty *description furnished above,* together with figures in the statistical table, are *composite of the data furnished by Bocage for* all three (*cordylus* + *angolensis*) of his Angolan lizards.

Peters (1869b) merely lists *griscus* without comment so it is impossible to say what he had. Boulenger's (1885e) Damaraland male would presumably be of the same form as Peters', while the later (1910b) example from Walfish Bay was collected by Nightingale. Hewitt (1911b) casts doubt on this record for Nightingale was also credited with taking *Oedura africana* in the same locality though the species is otherwise unknown from South West Africa.

Boulenger's (1897b) lizard from Aruwimi may be *angolensis* or else an undescribed form, it certainly would not be typical *cordylus*. Power (1930) remarks that *angolensis* is relegated to the synonymy of *C. c. jonesii* in the Zoological Record, this disposition is improbable but should receive attention when specimens are available. Monard (1937b) refers the two Bocage ("*cordylus*") without locality to *vittifer*.

Localities. ? **South West Africa:** Damaraland. **Angola:** Caconda. ? **Belgian Congo:** Aruwimi River.

Range. ? Northern South West Africa through Angola to the north-central Belgian Congo?

Cordylus cordylus rhodesianus (Hewitt)

1933a. *Zonurus cordylus rhodesianus* Hewitt, Occ. Papers Rhodesian Mus., p. 48, pl. ix, fig. 3: Monte Cassino, Macheke, Southern Rhodesia.
1935. Lawrence, p. 43.
1939b. FitzSimons, p. 30.

Description. Head much depressed; head shields strongly rugose; rostral separated from the frontonasal, which is longer than broad or as long as broad; nostril pierced in the lower centre of a large nasal which is not much swollen; a loreal; a preocular; median subocular not descending to the lip; fourth upper labial lowest, fifth highest; prefrontals forming a suture or separated; postfrontals as long as broad or shorter than broad; interparietal enclosed between 2 pairs of parietals; posterior parietals much larger than the anterior; 4–6 rugose; subequal occipitals; temporals rugose, keeled, without spines; sides of neck with keeled, spinose scales; gulars moderate, the anterior irregularly enlarged, the median slightly imbricate, smooth, the lateral elongate; collar scales larger but undifferentiated.

Dorsals slightly elongate, rugose, strongly keeled, shortly mucronate, posteriorly serrate, those on the vertebral line slightly smaller; laterals keeled, serrate, spinose; ventrals quadrangular, smooth not or but slightly imbricate; scales below fore limbs keeled, below hind limbs smooth or slightly keeled; tail with whorls of large, strongly striate, keeled, serrate spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown, lip to ear yellow; back yellowish or olive brown variegated, spotted, or longitudinally streaked, with darker, these markings tending to form irregular cross-bars in young; tail uniform olive brown. Below, whitish, uniform.

Size. Length of ♂ type (Albany Mus.) from snout to anus, 82 mm.; of a ♀ (T.M. 18526) from snout to anus, 80 mm., both having injured tails; total length of a young one (M.C.Z. 44422), 69 (38 + 31) mm. Both of latter being from Vumba Mountain.

Remarks. As indicated by its describer, this form occupies a somewhat intermediate position between *vittifer* and *c. joncsii*, agreeing with *vittifer* in its much depressed head, and in having the anterior row of nuchals slightly more enlarged than is the case with any other race of the *cordylus* group. It differs from *c. jonesii* in that its anterior pair of sublabials form a long (not short) median suture, and in lacking a

dark lateral band. It differs from *c. cordylus* (but scarcely or not from *jonesii*) in that its anterior gulars form a slightly enlarged group, yet scarcely so enlarged as to be called sublinguals, while the majority of the gulars are longitudinally elongate (not transversely broadened).

Originally based on 8 lizards, one of which is now M.C.Z. 33448, this form was not again reported until 10, four of which are M.C.Z. 44419-22, were captured by FitzSimons on Vumba Mountain.

Habitat. Occurs at 5000 feet on Vumba Mountain, among rocks.

Localities. **Southern Rhodesia:** Monte Cassino; Macheke; Triashill Mission, Rusape; Vumba Mountain.

Range. Southern Rhodesia (*C. c. jonesii* also occurs but in the southwest at Bulawayo).

Cordylus cordylus lawrenci (FitzSimons)

Plate 4, fig. 1

1937d. *Zonurus peersi* Hewitt (not Hewitt, 1932), p. 208.

1939a. *Zonurus lawrenci* FitzSimons, Ann. Transvaal Mus., **20**, p. 7, figs. 2–4: Lekkersing, Richtersveld, Little Namaqualand.

Description. Head much depressed, longer than broad; head shields strongly rugose; rostral separated from the frontonasal, which is shorter than broad; nostril pierced near the centre of a large nasal which is not much swollen; a loreal; a preocular; median subocular not descending to the lip; fourth upper labial lowest, fifth highest; prefrontals forming a suture; postfrontals as long as broad or shorter than broad; interparietal enclosed between 2 pairs of parietals; posterior parietals subequal to the anterior; 4 strongly keeled, unequal occipitals; temporals strongly keeled, the hindmost serrated posteriorly and almost covering ear; sides of neck with keeled, spinose scales; gulars large, the anterior irregularly enlarged the median slightly imbricate, smooth, or the laterals feebly keeled.

Dorsals squarish, not rugose, strongly keeled, shortly mucronate, posteriorly finely serrate, the two vertebral rows scarcely enlarged; laterals in vicinity of midbody as large as the dorsals, keeled, strongly serrate, spinose; ventrals quadrangular, smooth, not or but slightly imbricate; scales below fore limbs keeled, below thigh smooth or slightly keeled, below tibia keeled and mucronate; tail with whorls of large, strongly keeled, serrate, spinose scales above and below.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head black, posteriorly flecked with yellow; back dark brown, anteriorly flecked with yellow; flanks, limbs, and tail paler than dorsum. Below, gular region grayish, reticulately spotted with blackish; belly grayish; tail straw yellow.

Size. Total length of ♀ type (S.A.M. 18553), 151 (67 + 84) mm.

Localities. **Cape Province:** Little Namaqualand: Lekkersing.

Range. Little Namaqualand, Cape Province (known only from the type).

Cordylus cordylus tasmani (Power)

Plate 4, fig. 2

1909a. *Zonurus jonesii* Hewitt (part, not Boulenger), p. 36.
1930. *Zonurus cordylus tasmani* Power, Ann. Transvaal Mus., **14**, pp. 12, 16, pl. i, fig. 4: Dunbrody, Uitenhage Division, Cape Province.
1930. FitzSimons, p. 29.
1935. Lawrence, p. 43.
1937e. Hewitt, p. 30.

Description. Head much depressed; head shields strongly rugose; rostral separated from the frontonasal, which is longer than broad or shorter than broad; nostril pierced in the postero-inferior corner of a large nasal which is not much swollen; a loreal; a preocular; median subocular not descending to the lip; fourth upper labial lowest, fifth highest; prefrontals forming a suture or separated; postfrontals as long as broad or shorter than broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 5–6 rugose, subequal or irregular occipitals; temporals rugose, keeled, without spines; sides of neck with keeled, spinose scales; gulars moderate and large, the anterior irregularly enlarged, the median slightly imbricate, smooth, the lateral strongly keeled; collar scales larger but undifferentiated.

Dorsals squarish, rugose, strongly keeled, shortly mucronate, posteriorly serrate, the two vertebral rows enlarged; laterals in vicinity of midbody as large as the dorsals, keeled, serrate, spinose; ventrals quadrangular, smooth, not or but slightly imbricate; scales below fore limbs keeled, below hind limbs smooth or slightly keeled; tails with whorls of large, strongly striate, keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown, lip to ear yellow; back yellowish brown

or olive brown, spotted or longitudinally streaked with black or with irregular blackish cross-bars. Below, whitish or olive yellow, uniform.

Size. Total length of ♂ cotype (M.C.Z. 31572), 136 (70 + 66) mm.; of ♀ cotype (M.C.Z. 27122), 136+ (78 + 58+) mm., tail-tip missing.

Remarks. Its describer compares this race with *c. joncsii* with which it was said to agree in everything except larger laterals; it differs also in its more depressed head and in having 3 suboculars. Actually, as pointed out by Hewitt (1937d), it is more closely related to *c. cordylus* as one might expect from its distribution as a pocket within the range of the typical form.

This intermediate position is emphasized by the specimens from Steynsburg and Uitenhage in the Albany Museum, first referred to *c. jonesii* by Hewitt (1909a), and later (1911b) thought to be young *c. cordylus*, but which, according to Power (1930, p. 12) are more probably *c. tasmani*, and are therefore listed as such below.

Localities. **Cape Province:** Uitenhage Division: Dunbrody, Sunday's River; ? Steynsburg; Uitenhage.

Range. Uitenhage Division of Cape Province (surrounded by typical *C. c. cordylus*.)

Cordylus cordylus minor FitzSimons

1943. *Cordylus cordylus minor* FitzSimons, Lizards of South Africa, p. 458: Just north of Matjesfontein on road to Sutherland, Cape Province, Union of South Africa.

Description. Head strongly depressed; head shields finely rugose throughout; rostral separated from the frontonasal, which is broader than long; nostril pierced in the postero-inferior corner of nasal, which is not swollen; a loreal; a preocular; 3 suboculars, the median not descending to the lip; 6 upper labials, sixth with a strongly compressed keel; 4 supraoculars, fourth smallest; 3 supraciliaries; no supranasals; prefrontals in contact; frontal longer than broad, broadest anteriorly; interparietal enclosed between 2 pairs of parietals, which are subequal or posterior pair slightly smaller than anterior; 6 (sometimes reduced and irregular) occipitals similar in size and shape to adjacent nuchals; temporals rugose and sharply keeled; "lower posterior temporal spine strongly compressed, with a sharp projecting edge"; sides of neck with keeled, spinose scales; 5 lower labials, posterior keeled, bordered by a row of 5 large shields; gulars moderate, the anterior irregularly enlarged, the median imbricate, smooth.

Dorsals squarish, rugose, strongly keeled, not or but shortly mucronate mesially, more strongly so dorsolaterally, posteriorly feebly serrate, and forming 24–26 longitudinal rows (inclusive of laterals on flanks) and 27–28 transverse rows; laterals subequal to dorsals; ventrals quadrangular, smooth, forming 16 regular longitudinal and 24–26 transverse rows; 2 enlarged preanals; limbs above with large, keeled, spinose, imbricate scales; 4–6 femoral pores with 1–2 rows of swollen, glandular scales anteriorly; tail with whorls of large, striate, strongly keeled, serrate, spinose scales above and below, the dorsolateral spines longest.

Color. Above, head dark brown to blackish faintly speckled with dull yellow; back and tail dull olive brown sparsely spotted with black. Below, grayish white tinged with olive yellow posteriorly and on tail.

Size. Total length of ♂ cotype (Tvl. Mus. 19563) 139 (65 + 74) mm.

Remarks. Known to me only from original description (based on six cotypes) which should be consulted for further details. Said to differ from *c. cordylus* in being "smaller in size, head and body more strongly depressed, head shields finely rugose throughout, body scales smaller and more strongly keeled and spinose, fewer femoral pores and subdigital lamellae." That is 10–14 (usually 10–13) lamellae under fourth toe as against 13–17 in *c. cordylus*. In scale counts this new form apparently approaches the *pustulatus-namaquensis-campbelli* group.

Localities. Known only from the type.

Range. Vicinity of Matjesfontein, Cape Province.

Cordylus cordylus cordylus (Linné)

Plate 4, fig. 3

1758. *Lacerta cordylus* Linné, Syst. Nat. ed. 10, **1**, p. 202: Africa.
1760. Linné ed. 12, **1**, p. 361: "Africa; Asia" (error).
1900. Andersson, p. 7.
1768. *Cordylus versus* Laurenti, Syn. Rept., p. 52: Africa.
1802d. *Stellio cordylus* Daudin, p. 8.
1829. *Cordylus dorsalis* Cuvier, Règne Animal, ed. 2, **2**, p. 33: Africa.
1829. *Cordylus griseus* Cuvier, Règne Animal, ed. 2, **2**, p. 33: Africa.
1838a. Smith, A., p. 31.
1843. Smith, A., pl. xxviii, figs. 2–3; pl. xxx, figs. 8–8b.
1884a. Rochebrune, p. 107 (omit Senegambia as error).
1838. *Zonurus vertebralis* Gray, Ann. Nat. Hist., **1**, p. 388: Cape of Good Hope.
1839. *Zonurus griseus* Duméril & Bibron, p. 350.
1845. *Zonurus cataphractus* Gray (not Boie), p. 47.

1845. *Zonurus cordylus* Gray, p. 47.
1867a. Steindachner, p. 42.
1885e. Boulenger (part), p. 256 (omit Damaraland?).
1893a. Boettger, p. 66.
1897. Bateman, p. 107.
1898. Jeude, p. 21.
1898. Werner (1896–7), p. 140.
1898. Sclater, p. 103.
1907b. Roux (part), p. 417 (omit *niger* localities).
1909a. Hewitt, p. 37.
1910b. Boulenger (part), p. 468 (omit Transvaal, Natal and S. W. Africa records).
1910a. Hewitt, pp. 60, 71.
1910a. ?Werner, p. 324 (see Remarks under *C. namaquensis*).
1911. Gilchrist, p. 230, fig. 15b.
1911b. Hewitt, p. 47.
1913. Hewitt & Power, p. 153.
1913a. Werner, p. 107, fig.
1914a. Hewitt, p. 239.
1916. Andersson, p. 39.
1920. Hewitt, p. 93.
1921a. Dam, p. 242.
1925. Essex, p. 338.
1925b. Flower, p. 945
1926b. Rose, p. 492.
1927b. Hewitt, p. 452.
1928. Cott, pp. 927, 928.
1928a. Essex (1927), p. 931.
1929. Rose, p. 97, fig. 62.
1931. Mann, pp. 390, 397, 399.
1934a. Cott, p. 153.
1935. Lawrence, p. 43.
1937e. Hewitt, p. 29, pls. viii, fig. 4; x, fig. 4.
1937. Lawrence, p. 107, fig. 1.
1926b. *Zonurus cordylus flavus* Rose, Ann. S. African Mus., 20, p. 492: Robben Island, Cape Province, Union of South Africa.
1930. *Zonurus cordylus cordylus* FitzSimons, p. 29.
1930. Power (part), p. 16 (omit Umvoti).
1936h. Loveridge, p. 58.

Further citations of "*cordylus*" and "*griseus*" will be found under *vittifer, c. tropidosternum, c. jonesii, c. angolensis, c. niger, ukingensis,* and *cataphraetus.*

Native names. Cape Girdle-tail (English); klip salamander (local misnomer); *uroqotyeni.*

Description. Head much depressed; head shields slightly (anteriorly) or strongly (posteriorly) rugose; rostral 2½ (M.C.Z. 21570) to 4 (M.C.Z. 1940) times as broad as high, in contact with, or separated from, the frontonasal, which is longer than, or shorter than, broad, and sometimes divided (M.C.Z. 21567, 21570); nostril pierced in the postero-inferior corner of a moderate nasal which is not, or scarcely, swollen; a loreal; a preocular; 3 suboculars, the median not or but rarely descending to the lip between the fourth and fifth upper labials; 5–6 upper labials, fourth lowest, fifth highest; 3–4 supraoculars, the anterior longest, second broadest; 3 supraciliaries; no supranasals; prefrontals forming a broad or narrow suture, or separated; frontal pentagonal or hexagonal; postfrontals as long as broad or shorter than broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 4–5 rugose, subequal occipitals; temporals smooth or slightly rugose, keeled, without spines; side of neck with keeled, spinose scales; mental large; 5–6 lower labials, posterior largest and keeled, bordered by a row of 5 large shields; gulars moderate and large, the anterior irregularly enlarged, the median slightly imbricate, smooth, the lateral keeled, in 16–20 rows between angles of mandibles; collar scales larger but undifferentiated.

Dorsals squarish, slightly rugose, strongly keeled, shortly mucronate, posteriorly serrate, and forming 16–20 longitudinal rows (inclusive of laterals on flanks) and 25–29 transverse rows from occiput to base of tail; laterals like dorsals, keeled, serrate, spinose; a lateral fold; ventrals quadrangular, smooth not or but slightly imbricate, forming 12, rarely 10 or 14, regular longitudinal and 23–30 transverse rows between collar and anals; 2, rarely 4, enlarged preanals; limbs above with large, keeled, spinose, imbricate scales, below those on fore limbs keeled, on hind limbs smooth or slightly keeled; 6–9[1] femoral pores; tail with whorls of large, striate, strongly keeled, serrate, spinose scales above and below, the lateral spines longest.

Color. Above, head brown[2]; back yellowish olive, yellowish brown, olive brown, reddish brown, or blackish brown, uniform or variegated with darker, sometimes an irregular cream-colored vertebral line and a reddish lateral band present. The young are brown, or reddish brown, flecked with white. Below, greenish or yellowish white, uniform.

[1] 10–11 in a "South Africa" specimen (which agrees more nearly with *namaquensis*), *fide* Werner (1910a).

[2] Sometimes black, *fide* Rose (1926a).

Size. Total length of largest cotype (Stockholm Mus.), 170 (85 + 85) mm.; length of ♂ (M.C.Z. 21571) 166+ (84 + 82+) mm., of ♀ (M.C.Z. 21567), 158+ (84 + 74+) mm., their tails being injured, both surpassed by an unsexed specimen (Brit. Mus.) of 174 (84 + 90) mm.

Remarks. Lacerta cordylus was based on lizards figured in Seba, **1**, pl. lxxxiv, figs. 3–4 from Africa and Cape of Good Hope respectively, and Seba, **2**, pl. lxii, fig. 5 from Africa, called *Lacerta nigra* by Seba so probably the basis of what is now known as *C. c. niger* Cuvier. This can be settled as the probability of the five specimens now in the Royal Swedish Museum at Stockholm being the five cotypes from Drottingholm Museum is discussed by Andersson (1900).

Van Dam (1921a, p. 242) presents a table of characters in which *c. cordylus* differs from *vittifer*, though not all are valid. Later Hewitt pointed out that a median groove on the anterior portion of the frontal, almost always present in *c. cordylus*, is lacking in *c. niger*.

Anatomy. In a discussion of the branchial arch in lizards, Hewitt (1920) states that the epibranchials are present and that the hyoid has no relation with the ear. Mann (1931) remarks upon the structure of the eyes, which were described as being "reddish brown" by Sir A. Smith (1843).

Longevity. Three years, six months, ten days, in the London Zoological Gardens (Flower).

Breeding. Rose states that a single young one, two inches in length, is produced at a birth, but there are two ova, each measuring about 18 x 10 mm., in a ♀ (M.C.Z. 21410) from Grahamstown (N.D.).

Diet. Beetles, cockchafers, cockroaches, crickets and locusts (Hewitt). Though mainly insectivorous, this girdle-tail may at times be carnivorous, one having been seen to eat a young skink (*Mabuya* sp.), others to take scraps of preserved meat from a discarded tin, crumbs of currant cake, scraps of orange pulp, and even devour lichen from the rocks (Essex and Rose).

Parasites. Mites (*Scaphothrix convexa* and *Zonurobia cordylensis*) have been described from this race by Lawrence.

Enemies. One in stomach of a secretary bird (Andersson); "often a prey of kestrels" (Hewitt).

Habitat. The depressed form of this species facilitates its retreat into the crevices formed by cracks in the round boulders of dolerite abundant on the sides of the flat-topped mountains in the vicinity of Mortimer (Cott). In open country found beneath stones and rocks near which it basks until disturbed; on being alarmed it scuttles head first into its retreat so that the tail forms a protection for the body

(Hewitt). At times it lives, like *Gerrhosaurus*, in holes in the ground (Essex). Also occurs in dry logs and hollow stumps (Pannel in Hewitt) and will dash over or into shallow pools when frightened (Cronwright in Hewitt).

Localities.[1] **Cape Province:** Albany; Alexandria; Amatola Mountains; Bain's Kloof; Beaufort West; Bedford District; Bushman's River mouth; Cala; Cape St. Francis; Cape Town; East London; Fort Beaufort; French Kraal, Gaus Bay; Frenchhoek (Franschhoek); Gaika's Kop; George; Grahamstown; Hermanus; Hogsback; Hottentot's Holland Mountain; Houwhoek; Kalk Bay; Katberg summit; Kingwilliamstown;Kleinpoort near Committees; Kokstad; Knysna; Middleburg; Mitchel's Pass; Molteno; Montagu; Mortimer; Mossel Bay; Mount Ayliff; Mvenyane near Cedarville; Paarl; Philipstown; Port Alfred; Port Elizabeth; Queenstown; Robben Island; Sir Lowry's Pass; Somerset Strand; St. Croix Island; Stellenbosch; Steynsburg; Stutterheim; Swellendam; Tsomo, Transkei; Tulbagh District; Willowmore; Wynberg; Zuurberg, Alexandria Division.

Range. Chiefly coastal strip of Cape Province from Robben Island to East Pondoland. An isolated subspecies (*c. tasmani*) occurs within this range at Dunbrody just north of Port Elizabeth.

CORDYLUS CORDYLUS NIGER Cuvier

Plate 5, fig. 1

1735. *Lacerta nigra* Seba, Rerum naturalium Thesauri, **2**, p. 62, pl. lxii, fig. 5: Africa.
1829. *Cordylus niger* Cuvier, Règne Animal, ed. 2, **2**, p. 33: Africa.
1907b. *Zonurus cordylus* Roux (part, not Linné), p. 417.
1926b. *Zonurus cordylus niger* Rose, p. 492.
1929. Rose, p. 97, fig. 61.
1930. *Zonurus cordylus atrus* Power, Ann. Transvaal Mus., **14**, pp. 11, 16, pl. i, fig. 2: Cape Peninsula, Cape Province.

Description. Head much depressed; head shields smooth or only slightly rugose; rostral separated from the frontonasal, which is as long as broad or shorter than broad; nostril pierced in the postero-

[1] The Uitenhage record of Hewitt (1911b) is removed to *c. tasmani* by Power (1930), but apparently Hewitt (1937b) does not concur with Steynsburg being included in the transfer. Boulenger's (1910b) records of Johannesburg and Krugersdorp, Transvaal, and Umvoti, Natal are all *vittifer* according to FitzSimons (letter of March, 1943).

inferior corner of a moderate nasal which is not swollen; a loreal; a preocular; median subocular descending to the lip between the fourth and fifth upper labials; prefrontals forming a suture or separated; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 4, rarely 3, 5, or 6 smooth or slightly rugose, subequal occipitals; temporals smooth or slightly rugose, without spines; sides of neck with keeled, spinose scales; gulars moderate and large, the anterior irregularly enlarged, the median slightly imbricate, smooth; collar scales larger but undifferentiated.

Dorsals squarish, slightly rugose, strongly keeled, shortly mucronate; posteriorly serrate; laterals like dorsals, keeled, serrate, spinose; ventrals quadrangular, smooth, not or but slightly imbricate; scales below fore limbs keeled, below hind limbs smooth or slightly keeled; tail with whorls of large, striate, strongly keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, dull black, uniform. Below, black or gray, in young greenish white.

Size. Total length of ♂ (M.C.Z. 21555), 150 (67 + 83) mm., of ♀ (M.C.Z. 21573), 175 (85 + 90) mm.

Remarks. Apart from slightly smaller size, and color[1], *niger* differs from *c. cordylus* not only in the points mentioned in the key but in certain average characters such as *averaging* 10 (rarely 12, never 14) longitudinal rows of ventrals; head scales more or less smooth (not strongly rugose posteriorly); in having the scales of the occipital row smooth, rectangular, and *similar* to other head shields; in the vertebral series of scales being strongly keeled (not smooth).

Breeding. A single uniformly black young one produced at a birth (Rose).

Localities. **Cape Province:** Cape Peninsula: Cape Point; Cape Town; Muizenberg; Table Mountain (Range Cottage).

Range. Cape Peninsula (southern end from Cape Point to Muizenberg, meeting with the typical form in about equal numbers at Lion's Head).

[1] For causes of melanism in lizards see Parker, H. W., 1935, Proc. Zoöl. Soc. London, pp. 137.142.

Cordylus peersi (Hewitt)

Plate 5, fig. 2

1930. *Zonurus peersi* FitzSimons, p. 30 (*nomen nudum*).
1932. Hewitt, Ann. Natal Mus., **7**, p. 116, photo: Garies, Little Namaqualand, Cape Province, Union of South Africa.
1935. Lawrence, p. 43.
1937. Lawrence, p. 110.
1938. FitzSimons, p. 192.

Description. Head much depressed; head shields *very* strongly rugose; rostral separated from the frontonasal (by a granule in one cotype), which is as long as broad or shorter than broad; nostril pierced in the postero-inferior corner of a large nasal which is swollen; a loreal; a preocular; median subocular descending to the lip between the fourth and fifth upper labials; fourth upper labial lowest, fifth highest; prefrontals forming a suture, rarely separated; postfrontals as long as broad; interparietal enclosed between 2 pairs of parietals; posterior parietals subequal to the anterior; 4 rugose (but not keeled), subequal occipitals; temporals rugose, strongly keeled, without spines; sides of neck with keeled, spinose scales; gulars moderate and large, the anterior *not* irregularly enlarged, the median slightly imbricate, smooth or obtusely keeled; collar scales larger but undifferentiated.

Dorsals squarish, slightly rugose, strongly keeled, towards sides shortly mucronate, posteriorly serrate; laterals like dorsals, keeled, serrate, spinose; ventrals quadrangular, smooth, not or but slightly imbricate; scales below fore limbs keeled, below hind limbs smooth or slightly keeled; tail with whorls of large, striate, strongly keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, black, uniform. Below, black, uniform except for the femoral pores and lemon yellow callose patches on the femur of males.

Size. Total length of a ♂ (T.M. 18090), 169 (78 + 91) mm.; of a ♀ (T.M. 18088), 178 (81 + 97) mm.

Remarks. Its describer distinguishes *peersi* from *c. niger*, the only other entirely black member of the genus, by its swollen nasal which is never (1937d) so elongate as in *cordylus* and its races; by the gulars which are uniform anteriorly (except for a few lateral ones) and pass gradually into the larger posterior; by the stronger keeling of tem-

porals and dorsals; and by the band of minute scaling in the lateral fold.

Parasites. Mites (*Scaphothrix conversa* and *Zonurobia polyzonensis*) have been described from this species by Lawrence.

Temperament. Appears to be less timid than other members of the genus (FitzSimons).

Habitat. About a mile outside Garies, Peers found these lizards beneath weathered granite, saucer-like flakes which, on being levered up, were apt to slide down and consequently rendered the capture of the lizards more difficult. At Nieuwerust, about 90 miles south of Garies, and separated from it by a vast stoneless plain, others were encountered on kopjes where they were living under fragments of the great granite boulders. FitzSimons found *peersi* occupying the upper slopes of kopjes while *p. polyzonus* occurred on the lower.

Localities. **Cape Province:** Little Namaqualand: Garies; Kamieskroon; Nieuwerust.

Range. Little Namaqualand, Cape Province.

Cordylus ukingensis (Loveridge)

1900b. *Zonurus cordylus* Tornier (not Linné), p. 590.
1932a. *Zonurus ukingensis* Loveridge, Bull. Mus. Comp. Zoöl., **72**, p. 378, pl. iii, fig. 2: Tandala, Ukinga, Tanganyika Territory.
1933h. Loveridge, p. 301, pl. iii, fig. 2.
1937f. Loveridge, p. 495.

Description. Head slightly depressed; rostral separated from the frontonasal, which is as long as broad; nostril pierced in the postero-inferior corner of a *very* large nasal[1] which is not much swollen; no loreal; a preocular; median subocular not descending to the lip; fifth upper labial smallest, fifth not higher than others; prefrontals forming a suture; postfrontals longer than broad; interparietal on a line with the anterior parietals, in contact with the postfrontals; posterior parietals slightly larger than the anterior; 6 keeled occipitals; temporals rugose, keeled, without spines; sides of neck with keeled, spinose scales; gulars small, the anterior *not* enlarged, the median slightly imbricate, *all* strongly keeled and mucronate; collar scales large, lanceolate, and mucronate.

Dorsals squarish, rugose, strongly keeled, shortly mucronate, posteriorly serrate, the two vertebral rows enlarged; laterals like dorsals

[1] Tornier remarks that in one of his three specimens the nasal is divided on the right side to form a prae- and post-nasal as he terms them, on the left it is entire.

but smaller, keeled, spinose; ventrals quadrangular, keeled, not or but slightly imbricate, the lateral shortly mucronate; scales below fore and hind limbs keeled; tail with whorls of large, striate, strongly keeled, serrate, spinose scales above and below, dorsal and lateral spines subequal in length.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head dark brown; back sepia brown variegated with ochraceous brown; flanks flecked with lighter. Below, white, faintly mottled with gray.

Size. Total length of ♂ type (M.C.Z. 30761), 87 (54 + 33) mm.

Remarks. Diagnostic characters distinguishing *ukingensis* from *c. cordylus* and *c. jonesii* have been given in detail (1932a), and for *c. tropidosternum* (1933h) also. This dwarf form is known only from the type, and three specimens in the Berlin Museum.

Localities. **Tanganyika Territory:** Iringa; Kuthu steppe; Mbowu River, Unyika; Tandala, Ukinga.

Range. Southern highlands of Tanganyika Territory (i.e. mountains at north end of Lake Nyasa).

Cordylus macropholis (Boulenger)

1910b. *Zonurus macropholis* Boulenger, Ann. S. African Mus., **5**, p. 494: Little Namaqualand, Cape Province, Union of South Africa.
1930. Power, p. 16.
1933a. Power, p. 215.
1935. Lawrence, p. 44.
1936h. Loveridge, p. 58.
1937. Lawrence, p. 109.

Description. Head slightly depressed; head shields strongly rugose; rostral separated from the frontonasal, which is shorter than broad; nostril pierced in the postero-inferior corner of a large nasal which is not much swollen; a loreal; a preocular; median subocular not descending to the lip; fifth upper labial longest, not or but slightly higher than others; prefrontals forming a suture; postfrontals longer than broad or as long as broad; interparietal on a line with the anterior parietals, in contact with, or separated from, the postfrontals; posterior parietals *smaller* than the anterior; 4–5 rugose occipitals; temporals rugose, keeled, without spines but those of hind row pointed, projecting over ear; sides of neck with keeled, spinose scales; gulars large, a few anterior moderate followed by smaller, slightly imbricate, *all* strongly keeled and mucronate; collar scales large, keeled, mucronate.

Dorsals squarish, rugose, strongly keeled, shortly mucronate, posteriorly serrate, the two vertebral rows enlarged; laterals like dorsals but slightly smaller, keeled, serrate, spinose; ventrals quadrangular, smooth, strongly imbricate, the lateral strongly keeled and shortly mucronate; scales below fore limbs keeled, below hind limbs smooth or slightly keeled; tail with whorls of large, rugose, strongly keeled, serrate, spinose scales above and below, dorsal and lateral spines subequal in length.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head and back olive brown irregularly blotched with blackish brown. Below, pale olive or brownish.

Size. Total length of type, 130 (68 + 62) mm.; of a ♂ (Field Mus.), 119 (67 + 52) mm.

Remarks. For twenty-three years known only from the type, then Power obtained a series. The scale termed "postnasal" by Power (1933a) is that usually regarded as a loreal, similarly his "loreal" is the preocular.

Habitat. Never having been taken in rock crevices, this dwarf species is suspected of living in burrows (Lawrence).

Localities. **Cape Province:** Little Namaqualand: Kleinzee.

Range. Little Namaqualand, Cape Province.

Cordylus cataphractus Boie

Plate 5, fig. 3
Plate 6, figs. 1–2

1828. *Cordylus cataphractus* Boie, Nova Acta Acad. Leop.-Carol., **14**, pt. 1, p. 140: South Africa.
1843. Smith, A., pl. xxix, pl. xxx, figs. 9–9a–9b.
1831b. *Zonurus Cataphractus* Gray, p. 63.
1839. Duméril & Bibron, p. 355.
1885e. Boulenger, p. 255.
1887b. Boettger, p. 143.
1898. Sclater, p. 103.
1907b. Roux, p. 417.
1909a. Hewitt, pp. 33, 36.
1910b. Boulenger, p. 468.
1911d. Sternfeld, p. 21.
1914a. Hewitt, p. 240.
1929. Rose, pp. 100, 218, figs. 63–64.

1930. FitzSimons, p. 29.
1930. Peers, p. 402, photos. 1–4, pls. i-ii.
1930. Power, p. 15.
1930. Schmidt, p. 154, photo.
1931. Mann, pp. 390, 397.
1931. Popp. p. 191, photos.
1931. Senfft, p. 73, photos.
1933b. Noble & Bradley, p. 75.
1935a. FitzSimons, p. 533.
1935. Lawrence, p. 44.
1937. Lawrence, p. 110, fig. 3.
1938. FitzSimons, p. 191.
1834. *Zonurus cordylus* Schlegel (not Linné), p. 211, pl. vii, figs. 3–3c.
1938a. *Cordylus nebulosus* Smith, Mag. Nat. Hist. (2), **2**, p. 31: South Africa.

Native names. Armadillo lizard (English: Rose); *blinkoog* (Dutch: Peers).

Description. Head much depressed; head shields strongly rugose; rostral separated from the frontonasal, which is longer than broad; nostril pierced in the centre of a very large nasal which is much swollen; a small loreal present or absent; a preocular; median subocular not descending to the lip; third or fourth upper labial smallest, fifth frequently higher than others; prefrontals well separated; postfrontals longer than broad or as long as broad; interparietal on a line with the anterior parietals, in contact with the postfrontals; posterior parietals much larger than the anterior; 5–6 rugose occiptals, the outermost pointed and directed obliquely backwards; temporal region very prominent, temporals large, rugose, keeled, without spines, but those of hind row pointed, projecting over ear; sides of neck with keeled, spinose scales; gulars small, the anterior irregularly enlarged, the median not or but slightly imbricate, smooth, or the lateral feebly keeled; collar scales large, mostly smooth, imbricate.

Dorsals elongate, rugose, strongly keeled, shortly mucronate, posteriorly serrate, those on the vertebral line regular or irregular; laterals like dorsals but more spiny, keeled, serrate, spinose; ventrals elongate or quadrangular, *all* smooth, not or but slightly imbricate; scales below fore limbs keeled, below hind limbs smooth or some keeled; tail with whorls of large, rugose, strongly keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head and back usually yellowish brown, occasionally chocolate brown, uniform, or a piebald arrangement of these colors.

Young lizards are predominantly brown. Below, gular region light yellow vermiculated, streaked, or spotted with black; belly yellowish, clouded with greenish black or dark brown spots or stripes.

Transference of three armadillo lizards from their arid habitat to the moister and colder climate of the Cape Peninsula, resulted in *striking color changes*, but whether humidity, temperature, or food was the principal factor is not clear. A young lizard, two-and-a-half inches long, became a very light creamy yellow and grew larger than the adults. The latter, originally yellow and brown, changed to a lighter hue of greenish yellow, most apparent on their heads; meanwhile the brown of their backs became blotchy, not fading into yellow (Peers).

Size. Total length of ♂ (T.M. 15970), 211 (103 + 108) mm.

Remarks. According to Peers, about 20% of these lizards have the dorsal rows interrupted on the vertebral line instead of forming regular rows; such a variation, as well as normal and intermediate conditions, being found in members of a family group, there appears to be no geographical significance attached to it (Peers). Moreover it is to be found in several other species.

The best account of the bionomics of this lizard is that of Peers, to whose article I am indebted for much of the information given below.

Anatomy. The iris and pupil have been described by Mann.

Sexual dimorphism and dichromatism. The head of the male is broader, his habit more robust, his gular markings brighter than those of his mate, around whom he prances, his head held high, the better to display his brightly marked throat (Peers).

Breeding. Takes place about October when one or two young are produced, these rupturing the enveloping membranes immediately after parturition. (Peers), but in Germany a captive, 200 mm. female gave birth to a 100 mm. young one on February 2nd or 3rd, according to Popp, who furnishes a photograph of a pair in *coitu*.

Diet. When termites appear at the onset of the rains, armadillo lizards gorge upon them; the fat derived from this prey tides them over the succeeding weeks of wet and cold. Beetles and grasshoppers, whose movements are quickly observed by these bright-eyed lizards, are captured after a short rush which rarely fails (Peers).

In captivity young lizards will take maggots, other soft-skinned larvae, and flies. As they grow older, smooth caterpillars, beetles, crickets, but above all grasshoppers; on the latter, which seem most appreciated, they will feed to repletion. It is true that at first they will take mealworms, holding them in their jaws until dead, but these

appear to disagree with them for they are frequently regurgitated, while after a time the lizard will refuse them. Earthworms were also rejected. When some other lizards (apparently *Lacerta.* A.L.) were temporarily placed in their case, they were seized by head or middle, crunched and eaten by the carnivorous armadillo lizards. Senfft also fed his specimens with raw egg, brains, and a few drops of vigatol but failed to keep them alive (Popp, Senfft *et al*).

Enemies. Mongoose, musihonde and veld rats are a constant menace to the armadillo lizards which survive attacks by keeping close to their rocky crevices.

Defence. On gaining its rocky retreat an armadillo lizard takes full advantage of the prominent keeled temporals and its lateral spinosities by insinuating itself so firmly into the crevice that removal of the boulders is often necessary before the creature can be captured. When exposed in this manner, or if the little reptile has been intercepted before gaining its rocky refuge, the armadillo lizard coils up and takes its tail in its mouth. The strongly spinose and plated tail and limbs thus afford protection to the otherswise vulnerable under parts. Once this posture has been assumed the lizard will permit itself to be rolled around rather than uncoil, nor will it do so as long as it senses danger or sees movement in its immediate vicinity. The tail plays so important a role that it is never dropped as a means of defence, nor is it readily detached, but if part is lost regeneration is slow and the reproduced appendage apparently never attains the full dimensions. For further details see Peers' account.

Temperament. Relatively slow moving (Rose). In captivity at least the young are somewhat more active than the sluggish adults (Schmidt). On account of this sluggishness armadillo lizards are extremely easy to catch, readily tamed, and make the most confiding pets (FitzSimons). Consequently in the years 1930–1931 the market in Germany was flooded with them and accounts such as those of Senfft and Popp furnish many details of their care in vivaria, the necessity for sun-lamps, questions of humidity, and maintenance of temperatures of from 25–28° C. by day, 15–18° by night, etc.

Habitat. Found only in the smooth sandstone rocks; granite outcrops appear unsuitable, possibly because granite fractures less regularly and deeply than does the sandstone. The presence of these lizards in a crack is usually betrayed by undigested calcareous or chitinous fragments of insects from the excrement, such deposits being considerable where the crevice has been long occupied. Each fissure is inhabited by one family only, intrusion by an outsider being fiercely

resisted; however a family may consist of as many as eight individuals, i.e. the original pair of adults and their resulting offspring of several seasons.

A nocturnal gecko (*Pachydactylus b. bibronii*) seems to be the only other lizard permitted to share the family retreat, perhaps because no competition arises with regard to food. Though *Agama a. atra* and *Cordylus p. polyzonus* may be found on the same kopjes, there is no association with the armadillo lizard.

Localities. **Cape Province:** Bitterfontein; Calvinia District; Clanwilliam District; Hondeklip Bay; Jackalswater to Orange River; Kamaggas; Malmesbury; Matjesfontein[1]; Port Nolloth; Soebatsfontein; 32 miles west of Springbok along the Kamaggas Road.

Range. Western Cape Province to the southwestern corner of Little Namaqualand, i.e. a coastal strip of about 100 miles south of the Orange River and inland for about 150 miles[1].

Cordylus pustulatus (Peters)

Plate 6, fig. 3

1862a. *Zonurus pustulatus* Peters, Monatsb. Akad. Wiss. Berlin, p. 19: Nue Barmen, South West Africa.
1885e. Boulenger, p. 258.
1909a. Hewitt, p. 36.
1910b. Boulenger, p. 469.
1911b. Sternfeld, p. 401, fig. 1.
1911d. Sternfeld, p. 22.
1930. Power, p. 15.
1935. Lawrence, p. 44.

Description. Head much depressed; head shields rugose; rostral separated from the frontonasal; nostril pierced in the lower centre of a large nasal which is swollen; a loreal; a preocular; median subocular not descending to the lip; fifth upper labial smallest, fifth not higher than others; prefrontals forming a suture; temporals moderate, rugose, keeled, without spines; gulars small, almost granular.

Dorsals and other scales said to resemble those of *polyzonus*. This brief description is based on Peters, scanty one together with data derived from Sternfeld's side view of the head, a drawing which may not be too exact in details such as the number of labials, etc.

[1] Boulenger's (1910b) Matjesfontein record has been questioned by Power (1930) as being much too far east. However Dr. V. FitzSimons' assures me that *cataphractus* is plentiful at Matjesfontein.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head and back olive brown spotted with darker brown and yellow, with a tendency for the latter to form an indistinct dorsal line. Below, brownish yellow.

Size. Total length of a cotype (Berlin Mus.), 195 (82 + 113) mm.; and of one of Sternfeld's specimens, 170 (73 + 97) mm.

Remarks. Misled by Peters' comparing his cotypes with *polyzonus*, Boulenger (1885e), followed by Power (1930) assumed that *pustulatus* had supranasals. However, Sternfeld (1911b), with two additional lizards from "South West Africa", reëxamined the cotypes and stated that they, as well as his specimens, lacked supranasals and were more nearly related to *cordylus*. He invited attention to the suture from nostril to first labial which was displayed by all. Mertens (1937b, p. 8), commenting on a *pustulatus* in the Senckenberg Museum, confirmed Sternfeld's findings. FitzSimons (1943) treats *pustulatus* as a race of *cordylus*, but the large number of longitudinal dorsal scales (see statistical table) seem to preclude this.

Localities. **South West Africa:** Hereroland: "Neu Barmen" = Otjimbingue (*fide* Sternfeld).

Range. South West Africa.

Cordylus namaquensis (Methuen & Hewitt)

1910a. ?*Zonurus cordylus* Werner (not Linné), p. 324.
1914b. *Zonurus namaquensis* Methuen & Hewitt, Ann. Transvaal Mus., **4**, p. 137: Great Karas Mountains, South West Africa.
1930. FitzSimons, p. 29.
1930. Power, p. 15.
1935. Lawrence, p. 43.
1938. Fitzimons, pp. 190, 191.

Description. Head much depressed; head shields rugose except for two hindmost supraoculars; rostral rarely in contact with, usually separated from, the frontonasal, which is shorter than broad; nostril pierced in the lower centre of a very large nasal which is much swollen; a loreal; a preocular; median subocular not descending to the lip; prefrontals forming a suture; postfrontals as long as broad; interparietal on a line with the anterior parietals, in contact with the postfrontals; posterior parietals slightly larger than the anterior; 6 keeled occipitals; temporals moderate, rugose, keeled, without spines[1], but those of hind

[1] Hewitt says spines moderate or poorly developed.

row pointed, projecting over ear; sides of neck with keeled, spinose scales; gulars small, the anterior irregularly enlarged, the median slightly imbricate, smooth, or the lateral feebly keeled; collar scales large, only the lateral lanceolate and mucronate.

Dorsals elongate, scarcely rugose, moderately keeled, neither mucronate nor serrate, those on the vertebral line regular or irregular; laterals like dorsals but more spiny, keeled, serrate, spinose; ventrals quadrangular, smooth, not or but slightly imbricate; scales below fore limbs keeled, below hind limbs smooth; tail with whorls of large, striate, strongly keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown, heavily spotted, a dark streak from nostril through eye to ear or fore arm, a narrower streak from posterior corner of eye along upper edge of temporals, lower labials edged with darker; back light to dark chestnut brown variegated with darker brown; two dark brown lateral bands sometimes present. Below, grayish white to light muddy brown; tail light brown.

Size. Total length of type (T.M. 3163), 170 (81 + 89) mm.

Remarks. One wonders if Werner's (1910a, p. 324) *cordylus* from "S. Africa" with 10–11 femoral pores and color of *namaquensis* is not that species with which it agrees in all of the data published.

Parasites. Mites (*Zonurobia montana*) were found by Lawrence.

Habitat. Occurs at 6200 feet (Hewitt) as well as on lower slopes of mountain (FitzSimons) and in rocky crevices of a river bed.

Localities. **South West Africa:** Great Karas Mountains:—Kochena Farm; Narudas Sud Farm; Sandmund; and summit of a mountain near Wasserfall.

Range. Great Karas Mountains and vicinity, South West Africa.

Cordylus campbelli (FitzSimons)

1938. *Zonurus campbelli* FitzSimons, Ann. Transvaal Mus., **19**, p. 189: Barby Farm, 10–20 miles east of Helmeringshausen, South West Africa.

Description. Head much depressed; head shields rugose; rostral separated from the frontonasal, which is longer than broad or as long as broad; nostril directed upwards and outwards in a nasal which is much swollen and slightly tubular; lower eyelid with a semitransparent disk; prefrontals forming a suture; postfrontals as long as broad; inter-

parietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 6 keeled, rugose occipitals; temporals moderate, rugose, keeled, without spines, but those of hind row obtusely pointed and flattened, projecting over ear; sides of neck with keeled, spinose scales; gulars small, the anterior irregularly enlarged, the median slightly imbricate, smooth, or the lateral feebly keeled; collar scales large, only the lateral lanceolate and mucronate.

Dorsals elongate, scarcely rugose, obtusely keeled, neither mucronate nor serrate, those on the vertebral line irregular; laterals like dorsals but more spiny, keeled, serrate, spinose; ventrals quadrangular, smooth, slightly imbricate; scales below forelimbs keeled; below hind limbs smooth, serrately pointed, imbricate; tail with whorls of large, striate, strongly keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head chestnut brown, labial region lighter; back chestnut brown spotted and irregularly crossbarred with darker brown, a broad vertebral band or chain bearing pale yellowish spots; tail chestnut brown more or less barred with dark brown. Below, grayish white, gular region with rusty infuscations; forelimbs straw yellow; callose patch anterior to, as well as, femoral pores of male, pale yellow.

Size. Total length of ♂ type (T.M. 17635), 164 (76 + 88) mm.; of paratype ♀ (T.M. 17637), 162+ (79 + 83+) mm., tail-tip being lost.

Habitat. The type series were taken in rock fissures among outcrops on valley slopes of Barby Farm, which is northwest of Keetmanshoop and the Great Karas Mountains, Great Namaqualand.

Localities. **South West Africa:** Great Namaqualand: Barby Farm.

Range. Great Namaqualand, South West Africa.

Cordylus polyzonus polyzonus Smith

Plate 6, fig. 4
Plate 7, fig. 1

1838a. *Cordylus polyzonus* A. Smith, Mag. Nat. Hist. (2), **2**, p. 31: Cape of Good Hope.
1843. Smith, A., pl. xxviii, fig. 1; xxx, figs. 7–7b: North of Orange River and within the Colony, i.e. Cape Province.
1845. Gray, p. 47.
1839. *Zonurus polyzonus* Duméril & Bibron, p. 357.

1885e. Boulenger (part), p. 257.
1887b. Boettger (part), p. 143.
1888b. Fischer, p. 12.
1893a. Boettger (part), p. 66.
1896c. Bocage, p. 117.
1898. Sclater, p. 103.
1903e. Boulenger, p. 217.
1905h. Boulenger, p. 253.
1907b. Roux, p. 421.
1909a. Hewitt (part), p. 36 (omit Walfish Bay).
1910b. Boulenger, p. 469 (omit Natal as error).
1910a. Werner (part), p. 325 (omit S. Hereroland only).
1911b. Hewitt, p. 47.
1911b. Sternfeld (part), p. 402.
1911d. Sternfeld (part), p. 22, fig. 21 (omit Rehoboth, etc.).
1913. Hewitt & Power, p. 154.
1913a. Werner, p. 108.
1914b. Methuen & Hewitt (part), p. 137.
1918. Power, p. 264.
1928. Cott, p. 953.
1929. Rose, pp. 100, 218.
1930. FitzSimons (part), p. 29 (omit Okahandja).
1930. Power, p. 14.
1933a. Power, p. 215.
1934a. Cott, p. 153.
1935a. FitzSimons, p. 534.
1935. Lawrence, p. 43.
1936. Parker, p. 134.
1937a. FitzSimons, p. 266.
1937e. Hewitt, p. 30, pl. x, fig. 7.
1937. Lawrence, p. 109.
1938. FitzSimons, p. 192.
1940c. Scortecci, p. 7.

Further citations of *"polyzonus"* will be found under *p. jordani.*

Names. Karroo Girdle-tail (English); *likkwanakkedis* (Kogopa).

Description. Head much depressed; head shields rugose; rostral separated from the frontonasal, which is as long as broad or shorter than broad; nostril pierced in the postero-superior corner of a very small nasal which is much swollen; a loreal (rarely fused with first labial), a preocular; lower eyelid with a semitransparent disk; median subocular descending to the lip between the fourth and fifth, or fifth and sixth, upper labials; fourth upper labial lowest, fifth higher than others; *supranasals forming a suture;* prefrontals forming a suture;

postfrontals as long as broad or shorter than broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 5–6 rugose occipitals; temporals moderate (slightly smaller than in *p. jordani*), rugose, keeled, without spines, but those of hind row pointed, projecting over ear; sides of neck with short, keeled, spinose scales; gulars small or moderate, the anterior irregularly, or not, enlarged, the median slightly imbricate, smooth, or the lateral feebly keeled; collar scales slightly enlarged, undifferentiated.

Dorsals elongate, rugose, slightly or strongly keeled, neither mucronate nor serrate, those on the vertebral line regular or irregular; laterals like dorsals but more strongly keeled, serrate, spinose; ventrals quadrangular, smooth, not or but slightly imbricate, the lateral sometimes slightly keeled and shortly mucronate; scales below fore limbs keeled, below hind limbs smooth or slightly keeled; tail with whorls of large, rugose, strongly keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Very variable, scarcely two the same. Above, head brown; back yellowish brown, olive brown, chestnut brown, or blackish brown, uniform, variegated, or blotched with darker, the irregularly shaped spots tending to form two longitudinal lines; a blackish streak on side of neck; tail yellowish brown sparingly spotted with umber brown. Young are olive chequered with black and white, their tails barred brown and white. Below, whitish, yellowish, brownish or reddish, uniform or clouded with darker spots and stripes.

Power (1918) writes of the dark dorsal coloring harmonizing perfectly with the environment, but the "brilliant red" gular ventral surface possessed by both sexes throughout the year, displayed to advantage as they sit erect, is immediately concealed at the approach of danger by the lizard pressing its chin close to the rock. From this he concludes that the ventral pigmentation has no significance as a warning color. Later (1933a), he records De Aar lizards as being "very dark purple, almost black" below, those at Orange River Station, as being "brick red sprinkled with very dark purple" etc. Hewitt (1937e), however, speaks of adults which are almost black in the breeding season. For further variations consult FitzSimons (1935a; 1938).

Remarks. FitzSimons (1937a) offers comments on three cotypes in the British Museum. Scortecci (1940c) remarks on scale formation in this species, contrasting it with that of other families.

Size. Total length of a ♂ (T.M. 18206), 237+ (116 + 121+) mm., and of an unsexed specimen (T.M. 15343), 266 (114 + 152) mm.

Sexual dimorphism. Femoral pores are present in the males only to any appreciable degree of development.

Breeding. Mating takes place early in September and the young are born in January (presumably in Cape Province) according to Hewitt and Power. However four fully developed young were present in uteri of a female taken in April at Kubub, South West Africa (Werner).

Diet. Beetles, locusts and other insects, but one contained a gaudy and nauseous grasshopper (*Zonoeercus elegans*), another grass stalks (Hewitt & Power).

Parasites. Mites (*Ixodiderma inverta; Seaphothrix convexa; Zonurobia polyzonensis*) were found by Lawrence; while nematodes are said to infest this species at times according to Hewitt and Power.

Defence. The tail is employed to shield the body as soon as the rock shelter is reached, but the tail, though brittle, is not parted with unless the lizard is subjected to very rough handling (Hewitt & Power).

Temperament. Alert and active (FitzSimons). Shy and timid though occasionally attempting to bite when tormented (Hewitt & Power).

Hibernation. This is neither long nor deep (Hewitt & Power).

Habits. Apparently polygamous for nine females accompanied by only a single male were found in one locality (Hewitt & Power).

Habitat. This common species occurs in rocky situations over a wide area, often in the vicinity of human habitations. They like to bask in the fierce summer heat with belly pressed to the rock but forepart raised, the head and neck being almost vertical. In this position a lizard will remain for hours, only turning its head in response to sounds or to watch some movement in the vicinity. On hot days they face the sun, but on cold ones prefer to expose their backs to its warming rays. If disturbed each lizard quickly retires beneath some boulder or into its particular crevice, for they exhibit a marked attachment to the same retreat.

Localities. **Bechuanaland Protectorate:** Kuruman. **Orange Free State:** Bloemfontein; Boshof; Jacobsdal; Smithfield. **Cape Province:** Albert; Aliwal North; Barkly West; Belmont; Bredasdorp; Britstown; Bros Pan; Burghersdorp; Calvinia; Cape Town; Clanwilliam; Colesberg; Cradock; De Aar; Deelfontein; Fauresmith; Fort Richmond near Herbert; Fourteen Streams; Garies — near; Graaff-Reinet; Hanover; Hay; Herbert; Hoetjes Bay; Hope-

town[1]; Jackalswater; Kamaggas; Kenhardt; Kimberly; Klaver; Klipfontein; Knysna; Kubroos; Lambert's Bay; Lekkersing; Little Namaqualand; Malmesbury; Matjesfontein; Middleburg; Mortimer; O'okiep to Springbok; Orange River Mouth; Orange River Station; Philipstown; Pofadder; Port Nolloth; Prieska; Riet Pan; Rooidam; Rosmead; Rust-en-Vrede; Soebatsfontein; Steinkopf; Steynsburg; Steytlerville; Strydenburg; Touws River; Uitkyk; Upington; Van Rhynsdorp; Van Wyksvlei; Vredendal; Worcester. **South West Africa:** Aus; Aus to Bethany (Bethanien); Barby Farm; Great Karas Mountains; Great Namaqualand; Kakamas; Kolmanskop (M.C.Z.); Kubub; Kuibis; Luderitz Bay (Angra Pequena); Prince of Wales Bay; Sinclair Mine (? subsp); Warmbad.

Range. [2]Southern Bechuanaland, Orange Free State, and Cape Province west to southern South West Africa in Great Karas Mountains and at Aus and Barby (where it meets with the northern race—*jordani*).

Cordylus polyzonus jordani (Parker)

1862a. *Zonurus polyzonus* Peters (not Smith), p. 18.
1869b. Peters, p. 660.
1885e. Boulenger (part), p. 257.
1887b. Boettger (part), p. 143.
1890b. Müller, p. 699.
1893a. Boettger (part), p. 66 (Damaraland only).
1894a. Boettger, p. 89.
1907. Schultz, p. 188, fig.
1909a. Hewitt (part), p. 36 (Walfish Bay record).
1910a. Werner (part), p. 325 (Hereroland only).
1911b. Sternfeld (part), p. 402 (2 specimens lacking black mark).
1911d. Sternfeld (part), p. 22 (Rehoboth; Damaraland; Hereroland).
1914. Methuen & Hewitt (part), p. 137.
1915c. Werner, p. 338.
1930. FitzSimons (part), p. 29, (Okahandja, record only).
1936c. *Zonurus jordani* Parker, Novit. Zool., **40**, p. 133: Hoffnung, near Windhoek, South West Africa.
1938. FitzSimons, p. 191.
1937b. *Cordylus jordani* Mertens, p. 8.

Description. Head much depressed; head shields rugose; rostral separated from the frontonasal, which is as long as broad or shorter

[1] The Irene record was subsequently corrected by Hewitt (1911b).

[2] The Natal record is doubted by both Boulenger and Power, and is quite out of the question according to FitzSimons (letter).

than broad; nostril pierced in the postero-superior corner of a very small nasal which is much swollen; a loreal; a preocular; lower eyelid with a semitransparent disk; median subocular descending to the lip between the fourth and fifth, or fifth and sixth, upper labials, fourth or fifth upper labial lowest, fifth or sixth higher than others; *supranasals forming a suture;* prefrontals forming a suture; postfrontals as long as broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly larger than the anterior; 6 rugose occipitals; temporals large (slightly larger than in *p. polyzonus*), keeled, without spines, but those of hind row pointed, projecting over ear; sides of neck with short, keeled, spinose scales; gulars small, the anterior irregularly enlarged, the median slightly imbricate, smooth, or the lateral feebly keeled; collar scales slightly enlarged, undifferentiated.

Dorsals elongate, slightly rugose, moderately keeled, neither mucronate nor serrate, those on the vertebral line regular or irregular; laterals like dorsals but more strongly keeled, serrate, spinose; ventrals quadrangular, smooth, not or but slightly imbricate, the lateral sometimes slightly keeled and shortly mucronate; scales below fore limbs keeled, below hind limbs smooth or slightly keeled; tail with whorls of large, rugose, strongly keeled, serrate, spinose scales above and below, the lateral spines longest.

For characters common to all species, see definition on p. 9; for scale and pore counts, see statistical table on p. 15.

Color. Above, head brown or yellow; back yellowish, pale brown, or olive brown, uniform (in old lizards) or variegated and barred with darker; *no black streak on side of neck;* flanks yellowish to pale olive. Below, whitish or pale straw, uniform, or gular region longitudinally vermiculated with gray; tail yellowish or brownish.

Size. Total length of ♂ (T.M. 17468), 251 (125 + 126) mm.; of ♀ (T.M. 17496), 255 (127 + 128) mm. Length of ♀ holotype (Brit. Mus.) from snout to vent was 111 mm., the tail-tip lost.

Remarks. The describer, in addition to the characters utilized in the key for separating this form from *p. polyzonus*, mentions the larger temporals of *jordani*—a valid character but difficult to appreciate without comparative material—and the number of dorsals in transverse row, the latter no longer holds. FitzSimons (1938) says that in *polyzonus* there are usually 6 large sublabials beneath the lower jaw, whereas in his twenty-one *jordani* there are but 5. In our M.C.Z. material of *p. polyzonus* both 5 and 6 are so common that I doubt the value of such an average character for taxonomic purposes.

FitzSimons (1935a) reports that specimens from Aus—which is in

the area where one would expect to encounter intergrades—with 12–16 femoral pores, i.e. *p. polyzonus*, have the intensive caudal keeling, and spinosity which one would expect of *p. jordani*, thus offering further justification of our treating *jordani* as a race of *polyzonus*.

Localities. **South West Africa:** Aus — 15 miles east of; Barby Farm; Damaraland; Helmeringhausen; Hereroland; Hoffnung; Karub; Keetmanshoop; Kobos; Kraikluft; Kraikluft to Sandmund; Kraikluft to Alt Wasserfall; Neu Barmen; Neudamm Farm; Okahandja; Okosongomingo; Otjosongombe; Rehoboth; Usakos; Walfish Bay; Waterberg; Windhoek (Windhuk).

Range. South West Africa from Great Karas Mountains, Aus and Barby Farm, Great Namaqualand (where the typical form also occurs) north to Herreroland.

Genus Pseudocordylus

1838a. *Hemicordylus* A. Smith, Mag. Nat. Hist. (2) **2**, p. 32 (type *capensis* Smith).

1838a. *Pseudocordylus* A. Smith, Mag. Nat. Hist. (2) **2**, p. 32 (*type montanus* Smith = *microlepidotus* Cuvier).

Head and body depressed; limbs well developed; tail moderate. Head shields regular; nostril pierced in a nasal or between nasal and first labial; eyelids well developed; ear-opening large; 4 parietals; sides of neck covered with granules; a collar fold, attached mesially, at least indicated; dorsals usually small, soft or nodular, usually intermixed with granules, in more or less regular series which, if extending to occiput, are much reduced on nape if not granular; ventrals large, quadrangular or subtriangular, juxtaposed, smooth, forming longitudinal and transverse series; femoral pores present in both sexes; digits slightly keeled inferiorly; tail spinose.

Those species which I have examined appear to have the following characteristics in common, consequently these have been omitted from the specific descriptions.

Head longer than broad; head shields more or less smooth anteriorly, rugose posteriorly; rostral at least twice as broad as high; nasal scarcely swollen; postnasal present only as an aberration; a loreal; a preocular; subocular descending to the lip between two labials; fifth upper labial not higher than the others (except in figure of *m. fasciatus*); anterior supraocular longest, the second (sometimes first and second in *robertsi*) broadest; prefrontals forming a suture (sometimes separated

in *capensis* and *robertsi*); frontal hexagonal, slightly broader anteriorly; interparietal enclosed between 2 pairs of parietals (sometimes not in *capensis*); posterior parietals much (sometimes only slightly in *robertsi*) larger than the anterior; occipitals much reduced or absent; mental rather large; lower labials bordered by a row of 5 large shields; lateral collar scales enlarged but otherwise undifferentiated; a slight lateral fold; a pair of enlarged preanals; limbs covered above with large, keeled, more or less spinose, imbricate or subimbricate scales; tail with whorls of large, alternating with whorls of smaller, rugose, keeled, mucronate scales, the lateral spines longest, subcaudals long and narrow.

Range. Union of South Africa south of 24°S.

Remarks. The transference of *capensis* (and *robertsi*) from *Cordylus* to this group to which they appear more nearly related, for reasons stated elsewhere (p. 71), raises the question as to whether the subgenus *Hemicordylus*, which has paragraph precedence, should not be employed in preference to the former subgenus *Pseudocordylus*. As, however, this is not mandatory under the International Code of Nomenclature, I prefer to use the name *Pseudocordylus*, not merely on account of its having been raised to generic status by Gray (1845) and consequently long-standing in usage, but also because it is not improbable that later it may be found advisable to accord generic status to the group of annectant species at present characterized only by *capensis*, *robertsi* and *langi*.

Key to the Species

1. Flanks entirely covered with minute granules or at most some widely separated, small, subconical tubercles differing greatly from the enlarged dorsals 2
   Flanks entirely covered with granule-surrounded nodular scales, or scales only, which are a continuation of the dorsals 4

2. Back entirely covered with strongly keeled dorsals forming 10–12 longitudinal rows; ventrals in 8 longitudinal rows; range: southern Cape Province between False and Mossel Bays ..... *capensis* (p. 70)
   Back, or vertebral region only, covered with feebly keeled, or smooth, dorsals of which at most (in *robertsi* only) only one or two dorso-lateral rows are strongly keeled 3

3. Slightly enlarged dorsals form 12–20 irregular, ill-defined, longitudinal rows covering entire back; ventrals in 8 longitudinal rows; enlarged temporals 10–13; range: Van Rhynsdorp District, Cape Province ..... *robertsi* (p. 71)

   Slightly enlarged dorsals form 6–8 irregular, ill-defined, longitudinal rows in vertebral region; ventrals in 10 longitudinal rows; enlarged temporals 5–6; range: Drakensberg of Basutoland to eastern Cape Province (possibly southwestern Transvaal if Doornkop referable) *langi* (p. 73)

4. Temporals of the upper row enlarged and vertically elongate 5
   Temporals of the upper row relatively small and polygonal, at most but one or two vertically elongate 6

5. Median gulars mostly elongate like the lateral; range: Mountains of southern Transvaal and Orange Free State south to Drakensberg, Natal ..... *m. melanotus*[1] (p. 75)

   Median gulars more or less squarish, not even *slightly* elongate like the lateral; range: Mountains of western Cape Province ..... *m. namaquensis* (p. 78)

6. Enlarged temporals about 8–11; median gulars slightly elongate like the lateral; range: Mountains of the Cape Peninsula, Cape Province ..... *m. microlepidotus* (p. 79)

   Enlarged temporals about 16–17; median gulars more or less squarish, not even *slightly* elongate like the lateral; range: Mountains of eastern Cape Province ..... *m. fasciatus* (p. 80)

[1] Includes *subviridis* (A. Smith) and *s. transvaalensis* (FitzSimons).

STATISTICAL SYNOPSIS OF VARIATION IN THE GENUS PSEUDOCORDYLUS

Species or Race	Rostral breadth into height	Supraoculars	Supraciliaries	Suboculars	Upper labials	Lower labials	Occipitals	Enlarged temporals	Longitudinal ventral rows	Transverse ventral rows	Femoral pores
capensis	3	4	4	3	5–6	6	0	14–15	8	32	17–18
robertsi	2–3	"	4–5	"	5–7	5–7	0	10–13	8	33–36	16–18
langi	2½	"	4–5	"	6–7	5–6	0 to 11	4–6	10–12	31–36	6–14
m. melanotus	2½–4	"	3–5	"	4–7	5–6	0, 6–9	6–12	12	34–39	4–10
m. namaquensis	?	"	?	"	?	?	8	?	?	?	?
m. microlepidotus	2½–3	"	4–5	"	5–6	5–6	9	8–11	12–14	34–38	5–8
m. fasciatus	2¼	"	3–4	"	5–6	5–6	8	16–17	14	41	6–9

Pseudocordylus capensis (Smith)

Plate 7, figs. 2–3

1838a. *Cordylus* (*Hemicordylus*) *Capensis* A. Smith, Mag. Nat. Hist. (2), **2**, p. 32: Cape of Good Hope.
1843. Smith, A., pl. xxvii, fig. 2; pl. xxx, figs. 6–6b: Hottentot's Holland Mountain, Cape Province.
1839. *Zonurus Capensis* Duméril & Bibron, p. 360
1885e. Boulenger, p. 258.
1898. Sclater, p. 103.
1909a. Hewitt, p. 36.
1910b. Boulenger, p. 469.
1910a. Hewitt, p. 60.
1914a. Hewitt, p. 239.
1930. Power, p. 15.
1935. Lawrence, p. 44.
1937a. FitzSimons, p. 266.
1937d. Hewitt, p. 206.
1937. Lawrence, p. 110.

Description. Rostral separated from the frontonasal, which is longer than broad or as long as broad; nostril pierced in the lower centre of a nasal; median subocular descending to the lip between the fifth and sixth upper labials; postfrontals as long as broad; interparietal enclosed between two pairs of parietals or on a line with the anterior parietals, forming a suture with the postfrontals; posterior parietals much larger than the anterior; no occipitals; temporals of upper row vertically elongate; gulars smooth, a few anterior ones irregularly enlarged, the median more or less squarish.

Dorsum covered with large, squarish, unequal-sized, strongly keeled scales, more or less intermixed with minute granules, forming 10–12 longitudinal dorsal and 43–44 transverse series from *nape* to base of tail, the 2 vertebral rows largest and separated on the vertebral line by flattish granules of irregular shape; flanks covered with small subcircular granules; scales below fore limbs smooth, obtusely keeled, or granular, below hind limbs smooth or obtusely keeled.

For characters common to all species, see definition on p. 66, for scale and pore counts, see statistical table on p. 69.

Color. Above, head black or brown, back and sides black or purplish brown with, or without, seven to eight fine, transverse white lines on nape and back. Below, black, or throat and belly dull brownish red; soles of feet pale yellowish brown; tail grayish.

Size. Total length of type (?♀), first (1838a) given as 7½ inches, later (1843) expressed as 9 unc. 9 lines, is correctly rendered by Boulenger (1885e) as 264 (108 + 156) mm.

Remarks. FitzSimons considers that the discrepancy in size clearly indicates the use of two specimens, on the other hand misprints resulting from Smith's handwriting are not infrequent in "Illustrations." Smith himself says (1843) that the only example which he had seen was taken by Mr. Ford of the 49th Regiment and had been deposited in the Army Medical Museum at Fort Pitt, Chatham. This is obviously the specimen seen by FitzSimons in the British Museum, having been received by them from the Army Medical College.

No other specimens were recorded until Hewitt (1937d) discussed eight which he had received from localities to the northwest and east of the type locality. His findings are embodied in the redescription given above. It is he who suggested the subspecific relationship with *robertsi* which I have hesitated to adopt.

The transference of *capensis* from *Cordylus* to *Pseudocordylus* is because it agrees with the latter in having the neck covered with granules instead of scales, and is so closely related to *robertsi*, whose dorsals lack osteoderms, that I have no misgivings in effecting the transfer. Smith himself recognized the annectant character of *capensis* by erecting the subgenus *Hemicordylus* for its reception; my reasons for not using that name instead of *Pseudocordylus* are discussed under the generic heading.

Localities. **Cape Province:** Hottentot's Holland Mountain east of Stellenbosch; Jonkershoek near Stellenbosch; Langebergen near Swellendam.

Range. Cape Province (Between False and Mossel Bays).

Pseudocordylus robertsi (van Dam)

Plate 8, fig. 1

1921a. *Zonurus robertsi* van Dam, Ann. Transvaal Mus., **7**, p. 241, pl. iv: Klaver, van Rhynsdorp District, Cape Province.
1930. FitzSimons, p. 30.
1930. Power, pp. 13, 15, fig. 1, pl. ii, fig. 1.
1935a. FitzSimons, p. 532.
1935. Lawrence, p. 44.
1937d. Hewitt, p. 207.
1937. Lawrence, p. 110.

Description. Rostral separated from the frontonasal, which is longer than broad or as long as broad; nostril pierced in the lower centre of a nasal, often between nasal and first labial; median subocular descending to the lip between the fourth and fifth or fifth and sixth upper labials; postfrontals longer than broad or as long as broad; interparietal enclosed between 2 pairs of parietals; posterior parietals slightly or much larger than the anterior; no occipitals; temporals of upper row vertically elongate; gulars smooth, a few anterior ones irregularly enlarged, the median more or less squarish.

Dorsum covered with small, soft, subquadrangular, feebly or strongly keeled scales, sometimes intermixed with granules, forming 12–20 irregular (rarely regular) longitudinal and 42–64 transverse series from *nape* to base of tail, the 2 vertebral rows, and sometimes 2 dorsolateral rows, enlarged; flanks covered with small, subcircular granules; scales below forelimbs smooth, obtusely keeled, or granular, below hind limbs smooth or obtusely keeled.

For characters common to all species, see definition on p. 66, for scale and pore counts, see statistical table on p. 69.

Color. Above, head and back dark brown or blackish with scattered yellowish spots which sometimes tend to form cross-bars on the dorsum. Below, bluish white to blue gray, the gular region dark blue in males whose callose patches of femoral scales and pores are yellowish or dirty white.

Size. Total length of ♂ type (T.M. 3747), 267 (98 + 169) mm., exceeded in body length by a ♂ (T.M. 15656), 264 (104 + 160) mm.; length of a ♀ topotype (M.C.Z. 41875), 213 (85 + 128) mm.

Remarks. I had already transferred *robertsi* to *Pseudocordylus* prior to reading Power's (1930) remarks on the subject. Despite FitzSimons (1935a) statement, I can find no osteoderms by dissection and thus there appears no reason for retaining *robertsi* in *Cordylus* from all other species of which it differs in having the neck and flanks covered with granules. From the description of *capensis* I imagined that *robertsi* should be treated as a subspecies of it, as has been done by FitzSimons (1943, p. 438). However on receipt of a specimen of *capensis* and making direct comparison with a paratype of *robertsi*, such action appears unjustified. The nasal variation figured by Power seems of no significance and can be matched by members of either genus.

Parasites. Mites (*Zonurobia subquadrata*) described from this species by Lawrence, are most closely related to the species found on *Cordylus cacruleopunctatus*, a point that may have some significance.

Temperament. Shy and difficult to approach (FitzSimons).

Habitat. Found, together with *Agama a. atra*, on the precipitous edges of the escarpment overlooking the low country towards Van Rhynsdorp (FitzSimons), and among the sandstone rocks which form the "tables" of the Table Mountain sandstone near Clanwilliam and Van Rhynsdrop (Lawrence).

Localities. **Cape Province:** Klaver; Van Rhyn's Pass between Nieuwoudtville and Van Rhynsdorp.

Range. Cape Province (Van Rhynsdorp District).

Pseudocordylus langi spec. nov.

The following references *probably* relate to this form, which in FitzSimons (1943, pp. 467–469) is included in his "*s. subviridis.*"

1910b. *Pseudocordylus microlepidotus* Boulenger (part, not Cuvier), p. 469 (Morija, Basutoland).
1925. Essex, p. 338 (Amatola Mountains, Cape Province).
1925b. Hewitt, p. 356.
1928a. Essex, 1927, p. 932.
1927a. *P(seudocordylus) subviridis* Hewitt (not A. Smith), p. 392.
1935. Lawrence, p. 44.
1937e. Hewitt, p. 31.

Name. Lesser Caiman Lizard (Hewitt).

Type. Museum of Comparative Zoölogy, No. 46835, an adult or subadult ♂ from Mont-aux-Sources, Drakensberg, Basutoland, collected by Herbert Lang, November, 1930.

Paratypes. Transvaal Museum, Nos. 13846–7, 13849–50 from same locality as type at 11,000 feet; Nos. 2531, 2533 from Drakensberg on Basutoland side; No. 20992 from Drakensburg near Underberg at 6,000 feet; No. 21063 from Drakensberg near Kokstad.

Diagnosis. Differs from *P. capensis* and *robertsi* in the feeble development of enlarged dorsal scales which are confined to the vertebral region. Differs from *subviridis*, with which it has been confused, and all races of *microlepidotus* in having its flanks covered by homogeneous granules.

Description. Rostral separated from the frontonasal, which is shorter than broad; nostril pierced in the lower centre of a nasal; median subocular descending to the lip between the fourth and fifth labials; postfrontals as long as broad; upper row of temporals vertically elongate; gulars smooth, a few anterior ones slightly enlarged, the median elongated like the lateral.

Dorsum with an irregularly broad vertebral band of small, squarish,

smooth, juxtaposed scales, of which there are 6–8 in longitudinal series, flanked by still smaller, unequal granules similar to those on flanks which scarcely decrease in size towards the lowest part; below forelimb covered with granules; below hind limb anteriorly large smooth scales merging gradually into granules posteriorly. Type with 14 femoral pores.

Agreeing with characters common to all species as defined on p. 66; for scale and pore counts, see p. 69.

Color. In alcohol. Above, head grayish olive variegated with sepia; tip of snout to ear horn-yellow vertically striped with sepia on the lips; back olive brown with a vertebral series of coalescing pale spots which unite with others to form transverse series. Below, lower labials horny-gray indistinctly blotched with brown; throat, chest, belly, and beneath limbs plumbeous; neck, soles of feet, and tail horn-gray.

Size. Total length of type ♂ (M.C.Z. 46835), 221 (90 + 131) mm.

Remarks. I have not seen the Paratypes which are included on the basis of information kindly supplied by Mr. V. FitzSimons. Apparently lizards somewhat intermediate in character between *langi* and *subviridis* but nearer latter, occur at 7,000 feet on Mont aux Sources, for of Tvl. Mus. Nos. 13851–3 FitzSimons writes: "the scales on flanks are better developed, keeled and closer together, though still well separated by granular interspaces."

It should be added that all information below is based on the assumption that the lizards referred to in the above citations are truly *langi.*

Diet. Twice observed eating lichen from the rocks (Essex).

Parasites. Mites (*Ixodiderma inverta* and *I. pilosa*) described from this form by Lawrence.

Temperament. An active and wary lizard (Hewitt).

Habitat. From 11,000 feet down to 7,000 feet and lower at some points of Mont-aux-Sources, under rocks, but possibly a burrower according to Essex, who found one at the terminus of a sixteen-foot burrow in soft soil near the summit of Katberg.

Localities.[1] **Basutoland:** Drakensberg near Kokstad; Mont-aux-Sources; Morija; Nemahadi Police Camp; near Underberg at 6,000 feet. **Cape Province:** Amatola Mountains; Great Winterberg; Hogsback; Katberg; Malutsenyane; Thaba Putsua, Rabaneng Pass; Ugie.

Range[2]. Basutoland to eastern Cape Province.

[1] As all localities, except those of type and paratypes, are taken from the literature they should be regarded with reserve.

[2] Unless referable to *P. m. melanotus*, the specimens from Doornkop, near Belfast, Transvaal, mentioned by Hewitt, should be added.

Pseudocordylus microlepidotus melanotus (Smith)

Plate 8, figs. 2–3
Plate 9, figs. 1–3

1838a. *Cordylus* (*Pseudocordylus*) *melanotus* A. Smith, Mag. Nat. Hist. (2), **2**, p. 32: "Cape of Good Hope," later given as Hills near Orange River east of "Phillopolis," i.e. Phillipolis, Orange Free State.
1838a. *Cordylus* (*Pseudocordylus*) *sub-viridis* A. Smith, Mag. Nat. Hist. (2), **2**, p. 33: "Cape of Good Hope," later given as Mountains behind Kaffirland and Natal.
1843. *Cordylus microlepidotus* vars. A. Smith, pl. xxv, figs. A–B; pl. xxvi; pl. xxx, figs. 3–3b (*melanotus*) and 4–4b (subviridis).
1891a. *Pseudocordylus microlepidotus* Matschie (not Cuvier), p. 606.
1905h. Boulenger, p. 253.
1907b. Roux, p. 422.
1908b. Boulenger, p. 224.
1909a. Hewitt (part), p. 37 (Transvaal, Orange Free State, Natal).
1910b. Boulenger (part), p. 469 (Natal only).
1920. Hewitt, p. 93.
1937a. *Pseucordylus microlepidotus subviridis* FitzSimons, p. 266.
1943. *Pseudocordylus subviridis subviridis* FitzSimons (part, rest *langi*), p. 467.
1943. *Pseudocordylus subviridis transvaalensis* FitzSimons (? part, see *Remarks* below), Lizards of South Africa, p. 469: Woodbush, Pietersburg District, northern Transvaal.

Further citations of "*subviridis*" will be found under *langi*.

Description. Rostral separated from, or rarely in contact with, the frontonasal, which is as long as (M.C.Z. 46837), or shorter than, broad or longitudinally divided, sometimes with an azygous scale between it and the prefrontals (M.C.Z. 21274) or the nasals (M.C.Z. 21443); nostril pierced in the lower centre or postero-inferior corner of a nasal; median subocular descending to the lip between the fouth and fifth or fifth and sixth upper labials; postfrontals as long as broad or shorter than broad; upper row of temporals vertically elongate; gulars smooth, a few anterior ones irregularly enlarged, the median usually moderately or strongly elongated like the lateral.

Dorsum covered with small, flat or raised, subcircular or squarish, smooth or keeled, granular scales, forming more or less regular longitudinal and transverse series, those of the vertebral region smallest and more closely juxtaposed than the larger dorsolateral, which are separated by minute granules; scales on flanks subcircular or sub-

triangular, decreasing in size on lowest part of flanks and separated horizontally by granules interspersed with larger, flat, subcircular scales (*melanotus*) or each vertical series of scales juxtaposed (*subviridis*), the larger scales obtusely keeled (young) or smooth (adult); scales below fore limbs obtusely keeled or granular, below hind limbs smooth or obtusely keeled.

For characters common to all species, see definition on p. 66, for scale and pore counts, see statistical table on p. 69.

Color. Above, head brown variegated with yellow, tip of snout and lip to ear horn-yellow; back of male yellowish brown, brown, or black, with numerous spots in longitudinal series; back of female chequered with black and with series of elongated yellowish spots; both sexes with faint traces of obsolescent cross-bars descending to the flanks where they break up to form vertical bars; flanks yellow or orange yellow tinged with vermilion in male; sides of neck with one or two large black spots; limbs and tail handsomely barred or vermiculated with black. Below, gular region of male deep blue (sometimes extending up on to sides of head), of female yellowish infuscated with gray; belly greenish yellow tinged with vermilion; tail with dark cross-bars, the tip entirely black.

Size. Total length of a ♂ (M.C.Z. 14240), 273+ (120 + 153+) mm., from Forbes Reef, Swaziland, of a young ♀ (M.C.Z. 21274), 188 (88 + 100) mm., from Kastrol Nek, southeastern Transvaal.

Total length of ♂ (M.C.Z. 14241), 217 (97 + 120) mm., and ♀ (M.C.Z. 21443), 177 (88 + 89) mm., both from Giants Castle, Natal.

Remarks. Unfortunately the types of *melanotus* and *subviridis* are lost (FitzSimons, 1937a) and the present disposition must be regarded only as tentative. The precise status and ranges of the forms of this difficult group will not be settled until some South African herpetologist is able and willing to *assemble* all the material from the South African museums and subject them to intensive comparative study.

FitzSimons (1943, p. 464) places *melanotus* in the synonymy of *microlepidotus* which has small temporals. This is obviously wrong for Sir A. Smith's figure of *melanotus* (3b) shows it as having vertically elongate temporals like *subviridis* (4b). What FitzSimons calls *subviridis* (1943, p. 467) is a composite of *melanotus*, *subviridis* and *langi* spec. nov. That the name *subviridis* cannot be applied to the granular flanked *langi* (which is more closely related to *robertsi* than to any *microlepidotus*) is clear from Smith's statement that the flanks of *subviridis* are covered with keeled scales.

FitzSimons' figures of *subviridis* (figs. 373–374) from Giant's Castle

undoubtedly represent that form, which I am inclined to think may be separable as a southeast race on the basis of the almost continguous, vertical (not horizontal) juxtaposition of the lateral scales. In the more northern form (*melanotus* + *transvaalensis*) such scales are separated both vertically and horizontally by granules and with or without small, scattered, subcircular scales. Where the two forms merge it is impossible for me to say, and instead of speculating I prefer to treat both as *melanotus* for the difference may not prove to be constant when a large series is studied.

FitzSimons (1943, p. 463) separates two forms as follows:

A single row of large vertically elongate temporals; lowermost temporal spine moderately projecting in males . . . . . *s. subviridis*
Two rows of temporals, the upper vertically elongate and much larger than the subhexagonal lower; lowermost temporal spine feebly projecting and only bluntly pointed. . . . *s. transvaalensis*

Unfortunately these characters fail to separate our material in accordance with the supposed ranges. In the matter of temporals, not only do lizards from the same locality answer to both, but the temporals on one side of the head of an individual may correspond to the definition of *subviridis*, on the other to *transvaalensis*.

As for the degree of bluntness of the "temporal spine" i.e. lowest anteauricular scale, its condition appears to be affected by age and the degree of wear to which it has been subjected in rocky crevices.

There is, however, a substantial size difference of about 80 mm. in total length as between the southern and extreme northern forms. FitzSimons gives the following:

♂ 255 (110 + 145) mm. from Giant's Castle, Natal.

♂ 327 (151 + 176) mm. from Woodbush, northern Transvaal.

The seven specimens in the Museum of Comparative Zoölogy come from localities indicated by an asterisk below.

Localities. **Transvaal**: Doornkop near Belfast; *Kastrol Nek Farm, Wakkerstroom; Pretoria District; *Selati (Paratype of *transvaalensis*); Zoutpansberg District. **Swaziland**: *Forbes Reef. **Natal**: Balgowan; *Giant's Castle, Drakensberg; mountains behind Kaffirland; Umvoti.

Range. Transvaal south through Swaziland to Natal, east to Orange Free State and eastern Cape Province.

* In Museum of Comparative Zoölogy.

Pseudocordylus microlepidotus namaquensis Hewitt

1903e. ?*Pseudocordylus microlepidotus* Boulenger (not Cuvier), p. 217.
1909a. Hewitt (part), p. 37 (Richmond District record only).
1927a. *Pseudocordylus microlepidotus namaquensis* Hewitt, Rec. Albany Mus. **3**, p. 392, pl. xxii, fig. 1: Namaqualand.
1935. Lawrence, p. 44.

Description. Rostral separated from the frontonasal; upper row of temporals slightly vertically elongate; gulars smooth, the median more or less squarish or subcircular.

Dorsum covered with small, subequal, keeled, striate, nodular scales, forming more or less regular longitudinal and transverse series, those of the vertebral region smallest.

For characters common to all species, see definition on p. 66, for scale and pore counts, see statistical table on p. 69.

Color. Pattern not readily distinguishable. Below, gular region without infuscations.

Size. Length of type (S.A.M. 872) from snout to anus, 127 mm.

Remarks. Known to me only from the sketchy description and indistinct figure of the original citation, based on four specimens in the South African Museum. To these I have tentatively added, on geographical grounds only, Boulenger's (1903e) Deelfontein, Richmond District, record which was repeated by Hewitt (1909a) as *microlepidotus* at a time when none of the races were recognized. Whether *namaquensis* deserves recognition is uncertain though geographically probable.

Localities. **Cape Province:** Beaufort West; Deelfontein, 25 miles w. of Victoria West[1]; Namaqualand (whether Little or Great not known).

Range. Western Cape Province (west to "Namaqualand").

Pseudocordylus microlepidotus microlepidotus (Cuvier)

Plate 10, figs. 1–2

1735. *Lacerta Africana elegantissima* Seba, Rerum naturalium Thesauri **2**, p. 62, pl. lxii, fig. 6: Africa.
1829. *Cordylus microlepidotus* Cuvier, Règne Animal, ed. 2, **2**, p. 33: (based on Seba's plate).
1829–44. Guérin, Icon. Règne Animal, **1**, Rept., pl. vi, figs. 1–1a.

[1] See remarks.

1931b. Gray, p. 119.
1843. Smith, A., (part), pl. xxiv, fig. 1 (= A of text), pl. xxx, figs. 1–1a: Table Mountain near Cape Town, Cape Province.
1831b. *Zonurus microlepidotus* Gray, p. 63.
1834. Schlegel, p. 216 (pl. is captioned *Wittii*).
1839. Duméril & Bibron, p. 361. (omit Sierra Leone as error).
1834. *Zonurus wittii* Schlegel, pl. vii, figs. 1a–1c (but text refers to *microlepidotus* from) South Point of Africa.
1838a. *Cordylus* (*Pseudocordylus*) *montanus* A. Smith, Mag. Nat. Hist. (2), **2**, p. 32: Cape of Good Hope.
1845. *Pseudocordylus microlepidotus* Gray, p. 49.
1884a. Rochebrune, p. 107 (omit Senegambia as error).
1885e. Boulenger (part), p. 259.
1898. Sclater, p. 104.
1898. Werner (1896–7), p. 140.
1910b. Boulenger (part), p. 469. (Cape Town only).
1910a. Hewitt, p. 71.
1925b. Flower, p. 945.
1926b. Rose, p. 492.
1927a. Hewitt, p. 390, pl. xxiii, fig. 3.
1929. Rose, pp. 102, 106, figs. 67–68.
1935. Lawrence, p. 44.
1931. *Zonurus pseudocordylus* (in error) Mann, pp. 390, 398.
1939. Popp, p. 263.

Name. Crag Lizard (English: Rose).

Description. Rostral separated from, or rarely in contact with, the frontonasal, which is shorter or longer than broad; nostril pierced in the lower centre or postero-inferior corner of a nasal; median subocular descending to the lip between the fourth and fifth upper labials; postfrontals as long as broad; a few median and posterior temporals slightly vertically elongate; gulars smooth, the median more or less slightly elongate like the lateral.

Dorsum covered with small, flat or raised subequal, subcircular, smooth or obtusely keeled nodular scales, separated by minute granules, forming more or less regular longitudinal and transverse series, those of the vertebral region smallest; scales on flanks subequal, not decreasing in size appreciably, smooth or obtusely keeled; scales below forelimbs smooth, keeled or granular, below hind limbs smooth or granular.

For characters common to all species, see definition on p. 66, for scale and pore counts, see statistical table on p. 69.

Color. Above, head brownish red, lips and sides of head pale brown-

ish; back blackish or brownish red with series of ochre yellow spots which tend to form 7–8 cross-bars descending to the flank; where they may break up; sides of neck with one or two large blackish spots; limbs barred with yellow; tail narrowly streaked with yellow. Below, gular region black (Rose) or blue (Smith); belly dirty gray (Rose), yellowish or orange (Smith) tinged with red. Eyes chestnut brown (Smith).

Size. Total length 279 (221 + 58) mm. (Rose).

Remarks. I concur with Hewitt (1927a) that *montanus* was almost certainly the form (figured by Seba) on which Cuvier based his *microlepidotus* (without description).

Breeding. Four young are produced (Rose, *fide* Hewitt, 1937e).

Longevity. Two years, nine months, seven days (Flower).

Diet. This insectivorous lizard will eat even the spinous wingless locusts known as *korenkrekels* and at times vary their diet by taking lichen from the nearby rocks (Rose).

Parasites. Mites (*Ixodiderma inverta* and *Zonurobia semilunaris*) have been described from this form by Lawrence.

Enemies. One, when seized by a hawk, freed itself by discarding its tail, but was killed by the fall to the rocks below (Rose).

Temperament. When first captured this lizard can, and will, inflict a severe bite. In captivity it soon becomes docile, however, and will even take food from the fingers (Rose).

Habitat. Confined to the steeper crags from whose deep clefts it can be secured only by a noose at the end of a long wire (Rose).

Localities. **Cape Province**: Table Mountain and hills near Cape Town.

Range. Cape Province (mountains of Cape Peninsula).

Pseudocordylus microlepidotus fasciatus (Smith)

Plate 10, figs. 3–4
Plate 11, figs. 1–2

1838a. *Cordylus* (*Pseudocordylus*) *fasciatus* A. Smith, Mag. Nat. Hist. (2), **2**, p. 32: Cape of Good Hope.

1843. Smith, A., pl. xxvii, fig. 1; pl. xxx, figs. 5–5b: Rocky Hills near Grahamstown, Cape Province.

1838a. *Cordylus* (*Pseudocordylus*) *Algoensis* A. Smith, Mag. Nat. Hist. (2), **2**, p. 32: Cape of Good Hope.

1843. *Cordylus microlepidotus* A. Smith, (not Cuvier) pl. xxiv, fig. 2; pl. xxx, figs. 2–2b: Algoa Bay, Cape Province.

1927a. *Pseudocordylus fasciatus* Hewitt, p. 391.
1935. Lawrence, p. 44.
1937e. Hewitt, p. 31, pl. x, fig. 1.
1937a. *Pseudocordylus microlepidotus fasciatus* FitzSimons, p. 266.

Names. Crag Lizard or caiman (English); *kaaiman,* or sometimes *klip-lekkevan* (Afrikaans); *uroqotyeni* (Hottentot; = always on the stone). All taken from Hewitt (1937e).

Description. Rostral separated from, or rarely in contact with, the frontonasal, which is as long as broad; nostril pierced in the lower centre or postero-inferior corner of a nasal; median subocular descending to the lip between the fourth and fifth upper labials; postfrontals as long as broad or longer than broad; temporals polygonal, not vertically elongate; gulars smooth, a few anterior ones irregularly enlarged, the median more or less squarish.

Dorsum covered with small, raised, subcircular or subtriangular, feebly keeled (young) or smooth (adult) nodular scales, separated by minute granules, forming more or less regular longitudinal and transverse series, those of the vertebral region smallest; scales on flanks subequal, not decreasing in size appreciably, obtusely keeled; scales below fore limbs smooth or striate, below hind limbs smooth.

For characters common to all species, see definition on p. 66, for scale and pore counts, see statistical table on p. 69.

Color. Above, head brown variegated with yellow, lip to ear yellow or more or less tinged with red; back blackish brown, brown, or reddish brown, with 6–10 series of pale yellow spots[1] or bands[2]; sides of neck with one or two large blackish spots; flanks yellow, orange yellow, or brick red, without vertical bars, at most the dorsal bands encroaching but slightly; tail irregularly spotted with yellow. Below, yellowish tinged with reddish.

Size. Total length of ♂ (M.C.Z. 33449), 304+ (144 + 160+) mm., tail-tip missing.

Remarks. FitzSimons (1937a) was unable to locate the type. It is possible that *algoensis* (including Matschie, 1891a) may prove to be distinct and have to be removed from the synonymy.

Anatomy. Hewitt (1920) discusses the so-called branchial arch.

Diet. Beetles, crickets, grasshoppers, wood-lice, snails, and even small lizards (Essex in Hewitt, 1937e).

Parasites. Mites (*Ixodiderma inverta* and *Zonurobia semilunaris*) were found on this form by Lawrence.

[1] Only 1 or 2 orange spots on Abbotsbury males, whose females are more or less cross-barred.
[2] Bands complete in Butterworth lizards (Hewitt).

Temperament. An active but shy lizard which keeps close to its rocky retreat, basking with forepart upraised, the head and chin held high.

Habitat. Occurs at 5600 feet at Abbotsbury among the rocks on mountain slopes (Hewitt).

Localities. **Cape Province:** Abbotsbury near Lett's Kraal; Algoa Bay[1](?); Butterworth; Coetzee's Berg near Pearston; Dordrecht; Grahamstown — rocky hills in vicinity; Schurfteberg, Somerset East District; Tsomo.

Range. Cape Province (eastern part).

Genus Platysaurus

1844. *Platysaurus* A. Smith, Ill. Zool. S. Africa, Rept., footnote to pl. xi (type *capensis* Smith).

Head and body depressed; limbs well developed; tail moderate. Head shields regular; nostril pierced in the nasal[2]; eyelids well developed, the lower with a transparent disk; ear-opening large; 4 parietals; a collar fold, attached mesially, at least indicated; dorsals granular; sides of neck covered with granules; ventrals moderate, quadrangular, juxtaposed, imbricate, forming longitudinal and transverse series; femoral pores present in both sexes though sometimes scarcely distinguishable in females; digits slightly keeled inferiorly; tail with or without spines.

The seven forms which I have examined appear to have the following characteristics in common, consequently these have been omitted from the specific descriptions.

Head much longer than broad; head shields more or less smooth or slightly roughened posteriorly; rostral once and a half to twice and a half as broad as high; nasal not or scarcely swollen; a postnasal; a loreal; a preocular; 4 suboculars of which one or two descend to the lip between the labials; 4 supraoculars, the anterior longest, the second broadest; prefrontals forming a suture; frontal hexagonal, broader anteriorly; posterior parietals much larger than the anterior; mental rather large; lower labials bordered by a row of 5 large shields; collar scales enlarged but otherwise undifferentiated.

Dorsal granules small, flat or but slightly convex; median preanals more or less enlarged; limbs below with smooth (some keeled in

[1] Unless *algoensis* proves to be a recognizable form. Abbotsbury lizards are not quite typical according to Hewitt (1927a).

[2] *Not* between "nasal and first labial" as stated by Boulenger, the nostril being actually separated from labial and postnasal by a narrow rim.

g. guttatus and *g. rhodesianus*) scales which on tibia form a series of from 6–10 large plates; claws of the adpressed hind limb reach to axilla or shoulder, rarely neck, in *guttatus* and its races, to neck (♀) or temporal region (♂) in *capensis*, there being a tendency to shorter limb length in females; tail with whorls of elongate, quadrangular, rugose or keeled scales, the lateral with strongest keels, the subcaudals smooth.

Range. South Africa, on east north to the Zambezi, i.e. south of 16° S.

Remarks. An examination of the Statistical Synopsis of Variation will reveal the homogeneity of this group, rendering the compilation of a Key extremely difficult. Even so I imagine that when large rseries of certain forms are available apparent differences in scale-counts will overlap still more. I should like to see a Key based solely on the striking color differences of these various montane forms.

Key to the Species

1. A large occipital wedged between the posterior parietals; sides of neck covered with small *and* enlarged granules; granules on flanks distinctly enlarged; scales covering limbs above mostly rugose *and* strongly keeled; adpressed hind limb reaches axilla or shoulder (except in *guttatus fitzsimonsi* where it attains neck); range: southeastern Africa 2

   No occipital, at most 4–6 small scales mesially behind parietals; sides of neck covered with small subuniform granules; granules on flanks minute or but slightly enlarged; scales covering limbs above smooth or feebly keeled; adpressed hind limb reaches neck or temporal region; range southwestern South Africa 8

2. Adult length from snout to anus more than 90 mm. 3
   Adult length from snout to anus less than 80 mm. 5

3. Rostral *usually* in contact with frontonasal; inter-parietal *usually* separated from occipital; collar scales 6–7; ventral plates in 16–20 longitudinal and 39–45 transverse rows (*from collar*); length from snout to anus of adults *usually* less than 100 mm.; range: northern Transvaal . . . . . *g. guttatus* (p. 89)

   Rostral *usually* separated from frontonasal; inter-parietal *usually* in contact with occipital; collar scales 7–12; ventral plates in 18–26 longitudinal and 40–48 transverse rows (*from collar*) 4

4 Supraciliaries 4; enlarged temporals in 2 rows, upper largest; chin and throat very light blue without markings, belly and limbs below *not* uniformly dark blue; adult length from snout to anus over 100 mm.; range: Southern Rhodesia and Bechuanaland Protectorate ..... *g. rhodesianus* (p. 86)

Supraciliaries 5; enlarged temporals in 3 rows, median largest; chin and throat to chest of adult male entirely black spotted with pale blue, belly and limbs below uniformly dark blue; adult length from snout to anus 91 mm.; range: Lydenburg, eastern Transvaal ..... *g. fitzsimonsi* (p. 88)

5. Some dorsals in the vertebral series very slightly enlarged; lower surface in both sexes dark 6
Dorsals subuniform; lower surface in both sexes light but males with dark patches on belly 7

6. Interparietal forming a suture with a small occipital which may be broken up; spines on tibia towards heel poorly developed, on lateral caudals not at all; chin and throat of male gray green with black markings; edges of light lines on dorsum of female sharply defined; range: Tete, Mozambique ..... *g. torquatus* (p. 91)

Interparietal forming a suture with an occipital as large as itself; spines prominent both on tibia towards heel and on lateral caudals; chin and throat of male black; edges of light lines on dorsum of female blurred; range: Barberton, Transvaal and Ubombo, Zululand ..... *g. wilhelmi* (p. 92)

7. Males above, olive brown to reddish brown with light spots on dorsum arranged in longitudinal lines; in females such light spots are arranged in longitudinal lines also, but no black spots present on abdomen; flanks buff; range: Waterberg, Transvaal ..... *g. minor* (p. 93)

Males above, dull green to bluish green with light spots on dorsum scattered; in females such light spots are absent or only present posteriorly; but irregular black spots are present on abdomen; flanks dull green to bluish green; range: eastern face of Drakensberg, Transvaal ..... *g. orientalis* (p. 94)

8. Range: Little Namaqualand and Victoria West, Cape Province north to South West Africa ..... *capensis* (p. 96)

Species or race	Rostral breadth into height	Supraoculars	Supraciliaries	Suboculars	Upper labials anterior to subocular	Lower labials	Collar scales	Longitudinal ventral rows	Transverse ventral rows from collar	Femoral pores
g. rhodesianus	2–2½	4	4	4	4–5	5–6	7–12	18–26	40–48	19–25
g. fitzsimonsi	2	4	5	4	4	4–5	10	20	45	20–21
g. guttatus	2	4	4	4	4–5	5–6	6–7	16–18	39–40	16–20
g. torquatus	2	4	4	4	4–5	5–6	6	16–18	37	17–21
g. wilhelmi	2	4	4	4	4–5	5	6–8	18–20	37–39	18–20
g. minor	2	4	4	4	4–5	4–5	6–8	16–18	34–38	15–17
g. orientalis	2	4	—	—	—	—	—	20–22	38	14–20
capensis	1½–2	4	4–5	4	5–6	5–6	8–11	20	40–50	15–19

Platysaurus guttatus rhodesianus FitzSimons

1902b. *Platysaurus guttatus* Boulenger (not A. Smith), p. 16.
1909a. Chubb, p. 593.
1909b. Chubb, p. 35.
1909a. Hewitt (part), pp. 29, 38.
1913. Hewitt & Power, p. 154.
1930. FitzSimons (part), p. 31.
1932. Hewitt (part), p. 118.
1935b. FitzSimons, p. 350.
1939b. FitzSimons, p. 31.
1910b. *Platysaurus capensis* Boulenger (part), p. 469.
1934. Pitman, p. 304.
1941. *Platysaurus guttatus rhodesianus* FitzSimons, Ann. Transvaal Mus., **20**, p. 279: Vumba Mountain, Southern Rhodesia.

Description. Rostral sometimes in contact with, though more usually separated from, the frontonasal, sometimes by an azygous scale; frontonasal as long as broad or shorter than broad; second or second and third subocular descending to the lip; interparietal large, pentagonal, rarely diamond-shaped, rarely enclosed between 2 pairs of parietals, usually forming a suture with an occipital; enlarged temporals in 2 longitudinal rows, upper largest; sides of neck covered with granules, both small and enlarged; gulars small, elongate, those on the median line more or less enlarged and squarish; granules on flanks enlarged; limbs above with granules and rugose, strongly keeled scales.

For characters common to all species, see definition on p. 82, for scale and pore counts, see statistical table on p. 85.

Color. ♂. Above, head and back dull bluish green with three light longitudinal lines usually discernible on head, indicated or disappearing on back in old males, which may be almost uniform, lacking the light spotting displayed on back and limbs of young; flanks terra cotta in life; base of tail dull reddish yellow or yellowish green passing distally to green. Below, chin and gular region light blue (yellow to greenish yellow in young); a black gular collar sometimes extending to chest (much reduced and narrower in young); belly anteriorly terra cotta (in life) (blue in young), posteriorly dark grayish blue to black; limbs blue to dark blue; tail tangerine (in life) or straw color (in alcohol), passing distally to yellow, yellowish green, and finally green (yellow at base passing to green in young).

In life, according to FitzSimons, from whom this description is

largely adapted, very young males, though otherwise marked much like the females, display a terra cotta colored patch on the chest.

♀. Above, head and back dark brown or black with three sharply defined white to yellowish longitudinal lines, between which are rarely (Matopos), more usually *are not*, pale spots; flanks and limbs with pale spots; tail whitish with a dusky median line anteriorly. Below, bluish white to bluish gray, chin and gular region sometimes exhibiting a faint bluish tinge; belly anteriorly sometimes pinkish, middle of belly usually with a large bluish black patch or spotted with black; base of tail sometimes pinkish, otherwise straw to whitish.

Size. Total length of type ♂ (T.M. 18528), 272 (105 + 167) mm., and paratype ♀ (T.M. 18663), 241 (92 + 149) mm.

Remarks. FitzSimons (1935b) shows that in 8 of his 14, and (1939b) in 9 of his 31 specimens (which later became the type series), the rostral is in contact with the frontonasal, while in 4 out of 14 and 9 out of 31 the interparietal is separated from the occipital. Hewitt (1909a) found that 1 out of 10 lizards displayed an interparietal forming a wide suture with the occipital.

Parasites. Mites (*Zonurobia circularis typicus*) described by Lawrence from Salisbury "*guttatus*".

Habitat. On the granite hills about Zimbabwe this lizard is found in association with *Agama kirkii*, *Mabuya q. margaritifer*, and *Gerrhosaurus v. validus*, elsewhere, though found in association with *margaritifer* in the bushveld, the latter was not observed on the lower slopes of Vumba Mountain where *P. g. rhodesianus* was encountered, and from where the Museum of Comparative Zoölogy has a good series of topotypes collected by Mr. V. FitzSimons at the same time as the type.

Localities. **Southern Rhodesia:** Bikita; Bindura; Changadzi River; Chilimansi; Chishagwasha; Devuli River; Driefontein; Empandeni; Gwanda; Hunyani River; Importuni District; Insiza; Khami River; Livingstone; Lomagundi District; Matabeleland; Matopos Hills; Mazoe; Mtoko; Mount Silozi; Penahlonga; Plumtree; Salisbury District; Strathmore near Bulawayo; Vumba Mountain; World's View; Zimbabwe. **Bechuanaland Protectorate:** Tsessebee.

Range. Southern Rhodesia extending into northeast Bechuanaland Protectorate. (As yet there is no evidence of the occurrence of any *Platysaurus* in *Northern Rhodesia* so that Pitman's (1934) suggestion that *capensis* may occur there, lacks foundation, for the genus appears to be found south of the Zambezi only).

PLATYSAURUS GUTTATUS FITZSIMONSI subspec. nov.

Type. Museum of Comparative Zoölogy, No. 8982, an adult ♂ from Lydenburg, Transvaal, received in exchange from the British Museum, 1913.

Diagnosis. As given in preceding key to the races of *guttatus.* To which one might add that from *g. wilhelmi,* the only other member of the genus whose male has the whole undersurface either black or blue, *fitzsimonsi* differs in the pale blue spotting of its chin and jaws, and the very dark blue (instead of light blue) undersurface of body and limbs. Also in its three rows of temporals; smooth (not strongly keeled) plates on the upper anterior surface of hind limb; subuniform character of dorsal granules; more numerous transverse rows of ventrals; larger size, etc. etc.

Description. Head much longer than broad; rostral twice as broad as high, separated from the frontonasal, which is shorter than broad; nostril pierced in the postero-inferior corner of the nasal; a postnasal; a loreal; a preocular; 4 suboculars, the second descending to the lip; 4 upper labials anterior to subocular; 4 supraoculars, the anterior longest, the second broadest; 5 supraciliaries; prefrontals forming a suture; frontal hexagonal, broader anteriorly; a pair of postfrontals; interparietal large, pentagonal, forming a suture with an occipital; posterior parietals much larger than the anterior; enlarged temporals in three longitudinal rows, the median largest; sides of neck covered with granules, both small and enlarged; mental rather large; 4–5 lower labials, bordered by a row of 5 large shields; gulars small, elongate, those on the median line slightly enlarged and squarish; collar scales 10, the ill-defined collar fold attached mesially.

Dorsum covered with small, flat, granular scales, subequal; granules on flank enlarged; ventrals moderate, squarish or slightly broader than long, smooth, juxtaposed, forming 20 longitudinal and 45 transverse rows (from collar); median preanals enlarged; limbs above with granules and rugose, strongly keeled scales, limbs below with enlarged smooth scales which on tibia form a series of 7 large plates; claws of adpressed hind limb reach to neck; 20–21 femoral pores; tail with whorls of elongate, quadrangular, rugose or keeled scales, keels on the lateral strongest, only some of the subcaudals smooth.

Color. ♂ Above, head dark blue (? green in life) with three light longitudinal lines; back pale blue (? green in life) uniform or with a few faintly discernible light spots; limbs pale blue, the hind limbs

brown posteriorly; tail straw yellow (? red in life). Below. chin and *gular region deep black flecked with light blue,* merging with black of collar; *belly and limbs uniformly bright ultramarine* blue; tail straw yellow.

Size. Total length of type ♂ (M.C.Z. 8982), 226 (91 + 135) mm.

Remarks. This appears to be the most southern form of the larger races of *guttatus.* The only possible reference to it in the literature may be that of Hewitt (part, 1932, p. 119) where he writes of *guttatus* ranging as far south as White River, Barberton District.

Localities. **Transvaal:** Lydenburg (possibly also White River)

Range. Eastern Transvaal (Lydenburg District).

Platysaurus guttatus guttatus Smith

1849. *Platysaurus guttatus* A. Smith, Ill. Zool. S. Africa, Rept. App., p. 8: Limpopo River near the Tropic of Capricorn.
1882a. Peters, p. 52.
1885e. Boulenger, p. 262.
1898. Sclater, p. 104.
1907j. Boulenger, p. 484.
1909a. Hewitt (part), pp. 29, 38.
1910. Hewitt, pl. i, fig. 1 (for 1909a).
1911b. Hewitt, p. 48.
1930. FitzSimons (part), p. 31.
1935. Broom, p. 20, fig. 5c.
1935. Lawrence, p. 44.
1937a. FitzSimons, p. 266.
1938. Gorham & Ivy, p. 179.
1891a. *Platysaurus intermedius* Matschie, Zool. Jahrb. Syst., **5**, p. 606: Mphome, Zoutpansberg District, Transvaal.
1911c. Sternfeld, p. 419 (Mpoma).
1910b. *Platysaurus capensis* Boulenger (part, not Smith), p. 469 (Pietersburg only.

Further citations of "*guttatus*" will be found under its various races and *capensis.*

Description. Rostral usually in contact with, though sometimes separated from, the frontonasal, which is shorter than broad; second and third subocular descending to the lip; interparietal large, diamond-shaped, rarely pentagonal, enclosed between 2 pairs of parietals, rarely forming a suture with an occipital, which may be transversely divided; enlarged temporals in 2 longitudinal rows, upper largest; sides of neck

covered with granules, both small and enlarged; gulars small, elongate, those on the median line much enlarged, squarish or polygonal; granules on flanks enlarged; limbs above with granules and rugose, strongly keeled scales.

For characters common to all species, see definition on p. 82, for scale and pore counts, see statistical table on p. 85.

Color. ♂. Above, head brown; back bluish green to pale brownish red, with or without three light longitudinal lines, between which are irregular longitudinal series of light spots; flanks like back with faint spotting; base of tail pale orange or yellowish with or without a dusky median line. Below, chin and gular region light blue with or without blackish, or deep purplish brown, markings; a black gular collar; belly anteriorly pale blue, posteriorly dark blue; hind limbs blue though posteriorly like tail, straw yellow.

♀. Above, head and back olive brown with three rather poorly defined light longitudinal lines, between which are two longitudinal series of pale spots; flanks and limbs with pale spots; tail straw yellow, anteriorly with a dusky median line. Below, bluish white to blue; chin and gular region tinged with blue and marked with black; belly anteriorly pale blue, middle of belly usually with a large dark bluish black patch; tail straw yellow.

Size. Total length of ♂ (M.C.Z. 21231), 217 (84 + 133) mm., exceeded in length from snout to anus by one of 105 mm. from the same locality—Woodbush; length of type ♀ (Brit. Mus.), 165 (71 + 94) mm., exceeded in length from snout to anus by one of 87 mm. (Boulenger, 1907j).

Anatomy. The temporal region of the skull is discussed by Broom, the gall bladder by Gorham and Ivy.

Parasites. Mites (*Zonurobia circularis typicus*) recorded from this race by Lawrence.

Localities. **Transvaal** Blyde River; Dwars River; Gerlachshoop, Elands River; Gravelotte; Haenertsburg; Jachtsdrift; Koedoes River; Letaba Drift; Leydsdorp; Limpopo River near Tropic of Capricorn; Mokeetsi; Mphome or Mpoma; Nwanedsi River; Pietersburg; Shilowane; Woodbush; Zoutpansberg. (Hewitt's (1932) record of White River, Barberton District, is tentatively removed to the race *fitzsimonsi* His (1909a) record from Victoria West, Cape Province was based on a *capensis* Mr. FitzSimons informs me.

Range. Northern Transvaal (Zoutpansberg region).

Platysaurus guttatus torquatus Peters

Plate 11, fig. 3

1854. *Platysaurus capensis* Peters (not A. Smith), p. 616.
1855. Peters, p. 45.
1854. *Platysaurus guttatus* Peters (not A. Smith), p. 616.
1855. Peters, p. 45.
1879a. *Platysaurus torquatus* Peters, Sitz. Ges. naturf. Freunde Berlin, p. 10: Tete, Mozambique.
1882a. Peters, p. 52, pl. ixa.
1885e. Boulenger, p. 262.
1896a. Bocage, p. 98.
1907j. Boulenger, p. 484 (comments on).
1909a. Hewitt, pp. 31, 38.
1910a. Hewitt, p. 60.

Native name. *Búnio* (at Tete: Peters).

Description. Rostral in contact with, or separated from, the frontonasal, which is shorter than broad; second and third subocular descending to the lip; interparietal large, diamond-shaped, forming a suture with an occipital which may be broken up; enlarged temporals in 2 longitudinal rows, upper largest; sides of neck covered with granules both small and enlarged; gulars small, elongate, those on the median line slightly enlarged and squarish; granules on flanks enlarged; limbs above with granules and rugose, strongly keeled scales.

For characters common to all species, see definition on p. 82, for scale and pore counts, see statistical table on p. 85.

Color. ♂. Above, head and back black with three light (golden yellow in life) longitudinal lines on head, the lateral disappearing on back, flanking the vertebral line is a regular longitudinal series of light spots; flanks malachite green spotted with lighter; limbs dark brown spotted with rusty yellow; tail pale orange yellow (red in life). Below, chin and gular region gray green with black markings; a black gular collar; tail yellow (red in life).

♀. Above, head and back brownish black with three sharply defined, light, longitudinal lines between which are a longitudinal series of light spots; flanks grayish or brownish green; tail greenish gray (not red) with a median dusky line anteriorly. Below, chin and gular region bluish green; (?) a black gular collar; belly gray; tail gray brown.

Size. Total length of cotype ♂ (Berlin Mus.), 185 (72 + 113) mm., of cotype ♀ (M.C.Z. 37203), 161 (68 + 93) mm.

Remarks. It is just as well that Peters (1882a) described this lizard in great detail for no other specimens of it have been taken. He points out that in 1854 he referred the males to *guttatus*, the females to *capensis:* twenty-five years later he used the same material as types of *torquatus.*

Boulenger (1885e), doubtless misled by Peter's figure for he had no material, erred in saying that the gulars on the median line were not enlarged for Peters definitely says that two rows are enlarged (two, or possibly three in our cotype), though his figured specimen shows but slight enlargement and that only in the basal part. Hewitt (1909a) is equally mistaken in suggesting that *torquatus* can be separated from *capensis* on the grounds that the former has two and the latter only one median row enlarged, for in most of the forms much variation is displayed in this character.

Boulenger (1907j) points out that *guttatus* has from 70-90 dorsal granules in longitudinal series while *torquatus* has from 90–100. This is a character worthy of study in all the forms and one to which I have paid no attention.

Anatomy. Utilising *C. c. cordylus* for comparative purposes, Peters (1882a) discusses the viscera, skeleton, and skull of *torquatus,* stating that the latter has 20 teeth in the upper, 21 in the lower jaw; that the pupil is round, and that no lateral fold is present in life.

Habits. He claims that it is difficult to capture owing to the agility with which this lizard seeks shelter in the rock crevices, from which it can be taken only by removal of the rocks.

Habitat. It is to be found on the carbonaceous sandstone rocks between the Caruera Mountains and Tete, also a few miles north and southwest of Tete.

Localities. **Mozambique:** Tete, south bank of the Zambezi.

Range. Mozambique.

Platysaurus guttatus wilhelmi Hewitt

1908b. *Platysaurus guttatus* Boulenger (not A. Smith), p. 224.
1909a. *Platysaurus wilhelmi* Hewitt, Ann. Transvaal Mus., **2**, p. 29, Nelspruit, Barberton District, Transvaal.
1910. Hewitt, pl. i, fig. 2 (for 1909a).
1911b. Hewitt, p. 48.
1930. FitzSimons (part), p. 32.
1932. Hewitt (part), p. 119.
1935. Lawrence, p. 44.

Further citations of "*wilhelmi*" will be found under *g. orientalis.*

Description. Rostral in contact with the frontonasal, which is as long as broad or shorter than broad; second subocular descending to the lip; interparietal large, pentagonal, forming a suture with an occipital; enlarged temporals in 2 longitudinal rows, upper largest; sides of neck covered with granules, both small and enlarged; gulars small, elongate, those on the median line much enlarged and squarish; granules on flanks enlarged; limbs above with granules and rugose, strongly keeled scales.

For characters common to all species, see definition on p. 82, for scale and pore counts, see statistical table on p. 85.

Color. ♂. Above, head brown with three light longitudinal lines; back dull greenish with ill-defined light spots; flanks greenish, uniform; limbs dark variegated with lighter; tail straw yellow (red in life). Below, chin to chest deep black; belly ultramarine with some black mesially; limbs ultramarine; tail straw yellow (red in life).

♀. Above, head and back brownish black with three rather poorly defined light longitudinal lines, between which are a single, or posteriorly double, series of light spots; flanks and limbs with pale spots; tail terra cotta with a dusky median line anteriorly. Below, black or blackish gray; tail gray brown (pinkish in life).

Size. Total length of cotype ♂ (T.M.), 194 (82 + 112) mm., and ♀ (T.M.), 184 (66 + 118) mm.

Remarks. Hewitt (1909a) differentiated the adult male *wilhelmi* from *guttatus* by reason of its alleged broader head and heterogeneous dorsal granules which, in the female also, show some enlargement along the vertebral and dorsolateral lines. The character of the occipital scale he (1911b) later dropped from the diagnosis. It is more likely to be confused with *P. g. fitzsimonsi* under which race the points of difference are enumerated.

Parasites. Mites (*Zonurobia circularis transvaalensis*) are recorded by Lawrence.

Localities. **Transvaal:** Nelspruit; Queen's River (both in Barberton district). **Zululand:** Ubombo.

Range. Eastern Transvaal south to Zululand.

Platysaurus guttatus minor FitzSimons

1930. *Platysaurus guttatus minor* FitzSimons, Ann. Transvaal Mus., **14**, pp. 30, 31, fig. 10: Vygeboompoort, Waterberg District, northern Transvaal.

1935. Lawrence, p. 44.

Description. Rostral separated from the frontonasal, which is shorter than broad; second or second and third subocular descending

to the lip; interparietal large, diamond-shaped or pentagonal, sometimes separating the anterior parietals, sometimes *anteriorly* in contact with a small azygous scale, or posteriorly forming a suture with an occipital; enlarged temporals in 2 longitudinal rows, upper largest; sides of neck covered with granules, both small and enlarged; gulars small, elongate, those on the median line enlarged, squarish or irregular; granules on flanks enlarged; limbs above with granules and rugose, strongly keeled scales.

For characters common to all species, see definition on p. 82, for scale and pore counts, see statistical table on p. 85.

Color. ♂. Above, head and back olive green with three light longitudinal lines, indistinct on head and tending to break up or disappear on back, between the lines are longitudinal series of light spots; flanks buff; tail terra cotta. Below, chin to collar vivid blue; belly dark prussian blue extending on to base of tail, rest of tail salmon buff.

♀. Above, head and back dark olive brown with three sharply defined light longitudinal lines, between which are one or two longitudinal series of light spots; flanks and limbs with pale spots; tail terra cotta with a broad, dusky, median line anteriorly. Below, chin, gular region, chest and belly whitish (pale blue in life), uniform; tail gray brown.

Size. Total length of cotype ♂ (TM. 2109), 158 (65 + 93) mm. of cotype ♀ (T.M. 2367), 146 (61 + 85) mm.

Remarks. Of 135 specimens examined by FitzSimons not one exceeded 160 mm. in total length, the race was based on 73 specimens of which four are now M.C.Z. 41882–5. Of these 73 apparently about 44 possessed anterior parietals which were separated by the interparietal. The form is a perfectly good montane race though no great reliance should be placed on the scale characters originally cited by FitzSimons, for most will be found to vary widely within certain limits.

Parasites. Mites (*Zonurobia circularis spiniventer*) were described from this form by Lawrence.

Localities. **Transvaal:** Geelhoutkop; Modder Nek; Nylstroom; Palala River; Vgeboompoort.

Range. Transvaal (Waterberg District).

Platysaurus guttatus orientalis FitzSimons

1930. *Platysaurus wilhelmi* FitzSimons (part, not Hewitt), p. 32.
1932. Hewitt (part, not Hewitt of 1909a), p. 119.
1941. *Platysaurus minor orientalis* FitzSimons, Ann. Transvaal Mus., **20**, p. 280: Sekororo on lower slopes of Drakensberg about 40 miles from Leydsdorp, Transvaal.

Description. Known to me only from the original description, which was based on three males and a female, and took the form of contrasting with *minor*. These differences are given without comment.

Snout more sharply pointed; head more swollen in temporal region and in general a little larger in proportion to the body; granules in temporal region in 2–3 longitudinal rows (as against 3–4 in *minor*); gular scales across throat between last large sublabial on either side 19–22 (as against 16–18 in *minor*); ventrals in 20–22 longitudinal (as against 16–18 in *minor*) and 38[1] transverse (as against 34–38[1] in *minor*) rows; femoral pores 14–20 (as against 14–17 in *minor*) preceded by modified glandular scales arranged in 2–3 rows (as against a single row in *minor*); scales on forearm and tibia more strongly keeled and spinose, especially on heel where the spines are long and strongly pointed; upper caudals obtusely keeled (more or less smooth in *minor*), lateral caudals strongly keeled and sharply spinose (moderately keeled and not or but bluntly spinose in *minor*).

For characters common to all other races which I have examined, see definition on p. 82, for scale and pore counts, see statistical table on p. 85.

Color ♂. Above, head and back bluish green to dull green with three light longitudinal lines on head only; back with small irregularly scattered light spots; flanks dull green to bluish green. Below, chin and gular region blue passing to dark blue or bluish black on belly.

♀. Above, head and back very dark brown or black with three sharply defined light longitudinal lines, between which are *no light spots* except for a few posteriorly. Below, bluish white with scattered irregular black spots.

Size. Total length of type ♂ (T.M. 4527), 180 (65 + 115) mm.

Localities. **Transvaal**: Dientje Farm, near Vaalhoek, Pilgrim's Rest District; Perkoe Farm, near Olifant's River; Sekororo, 40 miles south of Leydsdorp.

Range. Transvaal (eastern slopes of Drakensberg).

[1] Counting from collar to within three or four rows of preanals, in contrast to method employed by FitzSimons.

Platysaurus capensis Smith

1844. *Platysaurus capensis* A. Smith, Ill. Zool. S. Africa, Rept. pl. xl: Great Namaqualand, South West Africa.
1845. Gray, p. 49.
1885e. Boulenger, p. 261.
1898. Sclater, p. 104.
1909a. Hewitt, pp. 31, 38.
1910b. Boulenger (part), p. 469.
1911b. Hewitt, p. 48.
1911b. Sternfeld, p. 403.
1911d. Sternfeld, p. 23.
1932. Hewitt, p. 118.
1935a. FitzSimons, p. 534.
1935. Lawrence, p. 44.
1937a. FitzSimons, p. 266.
1938. FitzSimons, p. 193.
1909a. *Platysaurus guttatus* Hewitt (part, not Smith), pp. 31, 38 (Victoria West record).

Further citations of "*capensis*" will be found under *g. rhodesianus*, *g. guttatus* and *g. torquatus*.

Description. Rostral rarely in contact with, usually separated from, the frontonasal, sometimes by an azygous scale; frontonasal as long as broad, sometimes with an azygous scale posteriorly; second or second and third subocular descending to the lip; sometimes a prefrontal also descending to the lip between loreal and preocular; interparietal large, diamond-shaped, enclosed between 2 pairs of parietals; occipitals broken up or absent; enlarged temporals in 2 longitudinal rows, upper largest; sides of neck covered with small granules only; gulars small, elongate, those on the median line more or less enlarged and squarish; granules on flanks minute or but slightly enlarged; limbs above with granules and smooth or feebly keeled scales.

For characters common to all species, see definition on p. 82, for scale and pore counts, see statistical table on p. 85.

Color. ♂. Above, head and back bright green anteriorly passing to dull orange on posterior third, with or without three light longitudinal lines on head which tend to disappear on back; between the lines some ill-defined light spots may be present or absent; flanks greenish blue and orange; tail yellow ringed with brown, a dusky median line anteriorly. Below, chin and gular region bright blue; belly anteriorly dark blue, in middle black, posteriorly whitish; limbs and tail pale straw yellow (grenadine in life), the latter ringed with darker.

♀. Above, head and back very dark brown with three well-defined light longitudinal lines, between which there are *no* light spots; flanks and limbs with obsolete pale spots; tail yellow alternately ringed with pale brown, a dusky median line anteriorly. Below, whitish, belly with or without pale blue and pinkish suffusions and a small black patch; tail straw yellow ringed with gray brown.

The above descriptions are adapted largely from FitzSimons (1935a), for more details of color variation see the same author for 1938.

Size. Total length of ♂ (T.M. 15883), 207 (78 + 129) mm., of type ♀ (Brit. Mus.), 197 (77 + 120) mm.

Remarks. FitzSimons (1937a) has reëxamined and confirmed the identity of the ♀ holotype in the British Museum. Boulenger (1910b) was in error in synonymizing *guttatus* with this species, a fact soon pointed out by Hewitt (1911b) who, in 1932, listed many distinguishing characters though some have not stood the test of larger series. Peters (1882a) states that the dorsal granules are in 80–84 rows.

Parasites. Mites (*Zonurobia circularis capensis*) were described from this species by Lawrence.

Habits. These extremely active lizards dart up vertical rock surfaces with the greatest ease (FitzSimons) to seek shelter beneath flat stones or in crevices from which they are difficult to dislodge on account of the use they make of their strong claws (Smith).

Habitat. In Great Namaqualand found always on rocky precipices (Smith), but in Little Namaqualand they appear to be confined to the rock and boulder-strewn river beds where great numbers may be seen in favoured localities (FitzSimons).

Localities. **Cape Province:** Aughrabies Falls, Orange River; Garies to Kamiesberg; Goodhouse; Kamieskroon; Kuboos; Lekkersing; Victoria West (Sclater, 1898, and Hewitt (1909a) but as *guttatus*.). **South West Africa:** Churutabis; Great Namaqualand.

Range. Cape Province (Victoria West and Little Namaqualand) to South West Africa.

Genus Chamaesaura

1801. *Chamaesaura*[1] Schneider (part), Hist. Amphib., **2**, pp. 205, 210 (type restricted to *anguina* Linné).

1820. *Monodactylus* Merrem, Versuch Syst. Amphib., p. 76 (type *anguina* Linné).

1826. *Chamaesaura* Fitzinger, Neue Class. Rept., pp. 18, 59 (type *anguina* Linné).

1832. *Cricochalcis* Wiegmann, Handbuch der Zool., p. 185 (no type designated but *aena* described though not named).

1862. *Mancus* Cope, Proc. Acad. Nat. Sci. Philadelphia, p. 339 (type *macrolepis* Cope).

For further synonymy see Boulenger, 1885e, Cat. Lizards Brit. Mus., **2**, p. 263.

Head elongate; body serpentiform; limbs short, rudimentary, or fore limbs absent; tail extremely long. Head shields regular, strongly striated; nostril pierced in the postero-inferior corner of the nasal; eyelids well developed, the lower scaly; ear-opening moderate; 4 parietals; no collar fold; dorsals larger than ventrals, otherwise both uniform, lanceolate, strongly keeled, strongly imbricate, forming longitudinal and transverse series; femoral pores present in both sexes though sometimes scarcely distinguishable in females; tail without spines.

The five known forms, all of which I have examined, have the following characteristics in common, consequently these have been omitted from the specific descriptions.

Rostral 3–4[2] times as broad as high; a large subocular bordering the lip with 3 (rarely 2 or 4) labials anterior to it; 3 supraoculars, the anterior longest, the second broadest; 3 supraciliaries, the anterior longest; frontal hexagonal or heptagonal; a pair of postfrontals which are subequal to the 4 parietals; temporals covered by imbricate, keeled scales; 4 (rarely 3 or 5) lower labials, bordered by a row of 4 (rarely 5 in *anguina*) chin shields.

Range. South, East, and Central Africa to northern Uganda, i.e. to 4° N.

[1] Sherborn, 1925, Index Animalium, p. 1209, is wrong in citing *Chamaesaurus*, and Fitz-Simons, 1943, p. 409, in giving the date as 1799.

[2] Five for *aenea* according to Boulenger (1885e, p. 263), seems improbable and does not agree with M.C.Z. material.

Remarks. An extraordinary homogeneous group except for the stages in limb reduction from the four-limbed, pentadactyle *aenea* to the two-limbed, monodactyle *macrolepis*, for which Cope proposed his genus *Mancus* solely on the absence of fore limbs.

Key to the Species

1. Midbody scale-rows 28; dorsals in 46 transverse rows from parietals to above anus; prefrontals forming a suture; fore and hind limbs pentadactyle; range: Cape Province north to Orange Free State and Transvaal ..... *aenea* (p. 101)

   Midbody scale-rows 26 or less; dorsals in 38–40 transverse rows from parietals to above anus; prefrontals separated by frontonasal forming a suture with frontal; fore and hind limbs, if present, monodactyle or didactyle 2

2. Fore limbs, though rudimentary and scale-like, divided or undivided 3
   Fore limbs minute or absent 4

3. Fore limb longer, its length being contained from 1 to 1¼ times in the distance from end of snout to anterior corner of orbit; range: eastern Cape Province, Natal and Zululand ..... *a. anguina* (p. 102)

   Fore limb shorter, its length being contained from 1½ to 1¾ times in the distance from end of snout to anterior corner of orbit; range: eastern Belgian Congo and western Tanganyika north to Kenya and Uganda ..... *a. tenuior* (p. 105)

4. Midbody scale-rows 24–26; fore limb minute; range: Angola east to Nyasaland and southern Tanganyika ..... *miopropus* (p. 107)

   Midbody scale-rows 22; fore limb absent; range: Natal and Zululand north to the Transvaal ..... *macrolepsis* (p. 108)

Species or race	Rostral breadth into height	Supraocular	Supraciliaries	Upper labials anterior to subocular	Lower labials	Large chin shields	Midbody scale-rows	Transverse dorsal rows from parietal to point above anus	Digits on fore limb	Digits on hind limb	Femoral pores
aenea	3[1]	3–3	3–3	3–4	3–4	4	28	46	5	5	3
a. anguina	3–4	"	"	3	4–5	4–5	26	38–40	1–2	1–2	2–3
a. tenuior	3–4	"	"	2–3	4	4	24–26	38–40	1	1–2	1–2
miopropus	3–4	"	"	3	—	4	24–26	38–40	1	1	1–2
macrolepis	3–3.5	"	"	3	4	4	22	38–40	0	1	1

[1] Five for *aenea* according to Boulenger (1885e, p. 263), seems improbable.

Chamaesaura aenea (Fitzinger)

1843. *Cricochalcis aenea* (Wiegmann) Fitzinger, Syst. Rept., p. 21: Africa
1880. *Chamaesaura miodactyla* Günther, Ann. Mag. Nat. Hist. (5), 6, p. 235, fig: "Peri" i.e. Pirie Bush, Cape Province.
1885e. *Chamaesaura aenea* Boulenger, p. 263.
1898. Sclater, p. 104.
1898. Werner (1896–7), p. 140.
1901. Gadow, p. 537.
1907b. Roux, p. 422.
1908b. Boulenger, p. 224.
1909a. Hewitt, pp. 34, 37.
1910b. Boulenger, p. 470.
1910a. Hewitt, pp. 56, 71.
1911b. Hewitt, p. 47.
1913a. Werner, p. 109.
1922. Duerden & Essex, p. 269, fig. 1.
1923. Duerden, p. 362.
1928a. Essex (1927), p. 883, figs. 1, 4, 7–14.
1935. Lawrence, p. 44.
1937e. Hewitt, p. 32, pl. x, fig. 3.
1938. Gorham & Ivy, p. 179.
1898. *Chamaesaura macrolepis* Werner (1896–7) (not Cope), p. 141.

Name. Transvaal Snake-lizard (English: Hewitt).

Description. Rostral in contact with, or separated from, the frontonasal; two superposed loreals (= a loreal over a postnasal); a preocular; prefrontals forming a suture; anterior pair of parietals separated by an interparietal, posterior pair by an occipital; fore and hind limbs well-developed, pentadactyle, clawed.

For characters common to all species, see definition on p. 98, for scale and pore counts, see statistical table on p. 101.

Color. Above, head and back dark brown with three (vertebral and dorsolateral) light yellow or gray, black-edged, longitudinal lines; flanks straw color with two or three longitudinal series of dark spots or a reddish brown lateral band. Below, whitish or greenish white.

Size. Total length of ♂ (M.C.Z. 14204), 397 (95 + 302) mm., from Belfast; of the type of *miodactyla* (Brit.Mus.), 320+ (90+230+) mm., the tail being regenerated.

Thus the tail may comprise nearly three-quarters of the total length. Two 460 mm. adults had fore limbs of 11 mm. long, hind limbs of 14 and 16 mm. respectively (Essex).

Remarks. Boulenger (1885e) places the nostril in the antero-inferior

portion of the nasal, this is rejected for postero-inferior, for it does not differ in this respect from other members of the genus a position which some might prefer to describe as in the lower centre.

Schmidt (1919) sees no reason for Werner (1898) having referred three Natal lizards to *macrolepis*, two at least had four limbs and on one they were pentadactyle, apparently three species are involved!

Anatomy. Duerden & Essex (1922) discuss the skeletal structure of the limbs; Gorham and Ivy (1938) deal with the gall bladder.

Habitat. Grass veld uplands.

Localities. **Transvaal:** Belfast (M.C.Z.); Lydenburg District; Middleburg District; Modderfontein; Pretoria District; Standerton District; Zoutpansberg District. **Natal. Orange Free State. Cape Province:** near Cathcart, Amatola Mountains; Drakensberg; Fenella Falls, Tarkastad District; Oakville Farm, Elliot District; Pirie (Peri) Bush.

Range. Transvaal south through Orange Free State to eastern Cape Province and Natal.

Chamaesaura anguina anguina (Linné)

Plate 12, figs. 1b, 2–3

1735. *Vermis serpentiformis* Seba, Rerum naturalium Thesauri, **2**, p. 70, pl. lxviii, figs. 7–8: Cape of Good Hope.
1758. *Lacerta anguina* Linné, Syst. Nat., ed. 10, **1**, p. 210: Cape of Good Hope, i.e. Union of South Africa.
1760. Linné, ed. 12, **1**, p. 371.
1768. *Chalcides pinnata* Laurenti, Syn. Rept., p. 64: Cape of Good Hope.
1795. *Chalcida anguina* Meyer, p. 31.
1801. *Chamaesaura Anguinea* (sic) Schneider, p. 210.
1802d. *Seps monodactylus* Daudin, Hist. Nat. Rept., **4**, p. 342, pl. lvii, fig. 1: Cape of Good Hope.
1811. *Chalcides monodactylus* Oppel, p. 45.
1820. *Monodactylus anguinus* Merrem, p. 76: Africa.
1838. *Chamaesaura anguina* Gray, p. 392.
1839. Duméril & Bibron, p. 441.
1845. Gray, p. 61.
1849. Smith, A., App., p. 10.
1851. Gravenhorst, p. 309, pl. xxx.
1867a. Steindachner, p. 42.
1885e. Boulenger, p. 264.
1889. Boettger, p. 292.
1890a. Müller, p. 286.
1893a. Boettger, p. 66.

1898. Sclater, p. 104.
1898. Werner (1896–7), p. 140.
1905h. Boulenger, p. 253.
1907b. Roux, p. 423.
1908b. Boulenger, p. 224.
1909a. Hewitt, pp. 34, 37.
1910b. Boulenger, p. 470.
1911b. Hewitt, p. 47.
1913a. Werner, p. 109, fig.
1922. Duerden & Essex, p. 270, figs. 2–3.
1923. Duerden, p. 362.
1925. Essex, p. 339.
1926b. Rose, p. 493.
1927b. Hewitt, p. 454.
1928a. Essex (1927), pp. 884, 932, figs. 2, 5, 15, 16, 17.
1929. Rose, pp. 113, 125, fig. 82.
?1933m. Witte, p. 72 (Elisabethville, B. C., so removed to *C. a. tenuior*).
1935. Lawrence, p. 44.
1937e. Hewitt, p. 32, pl. x, figs. 2, 6.
1890d. *Chamaesaura didactyla* Boulenger Proc. Zool. Soc. London, pp. 78, 82, pl. xi, fig. 1: South Africa.
1898. Sclater, p. 104.
1898. *Chamaesaura macrolepis* Werner (1896–7) (not Cope), p. 141.

For an extensive bibliography for the century prior to 1839, see Duméril & Bibron, 1839, Erpét. Gén., **5**, p. 441.

Native names. Cape Snake-lizard (English: Hewitt); *sweepslang* or *pootjie slang* (Afrikaans, but latter not even generic: Hewitt); *unombatamb'ezantsi* (Kaffir: Hewitt).

Description. Rostral in contact with, or separated from, the frontonasal; a postnasal; a single or two superposed loreals; a preocular; prefrontals separated by the frontonasal being in contact with the frontal; anterior, and sometimes the posterior, pairs of parietals separated by a large interparietal, or the posterior by one or two small scales, or posterior pair in contact posteriorly; fore and hind limbs styliform, undivided, or hind limbs divided, terminating in minute claws, or clawless.

For characters common to all species, see definition on p. 98, for scale and pore counts, see statistical table on p. 101.

Color. Above, head and back dark brown, uniform or latter laterally edged with black forming a pair of dark longitudinal lines; a light vertebral line; flanks straw color with or without a narrow, longitudinal, white lateral band. Below, whitish or golden yellow.

Size. Total length of type of *didactyla* (Brit. Mus.), 530 (110 + 420) mm., of a ♀ (M.C.Z. 21430), 467 (115 + 352) mm.

Remarks. As Hewitt (1909a) and so many authors have pointed out, the variability of this species in respect to its limbs being monodactyle or didactyle is unquestionable. Roux (1907b) comments on one lizard with a didactyle and two-clawed right fore limb whose other three feet were monodactyle, another had clawed fore limbs but clawless hind limbs. Whether clawlessness in members of this genus implies that the claws have not been developed or have been lost, is a matter which requires investigation.

Anatomy. Duerden & Essex (1922) and Essex (1928) remark that the fore and hind limbs average 6 and 8 mm. respectively and usually terminate in a single claw, and discuss limb reduction generally.

Breeding. In February, 4 or 5 young are born when about six inches in length (Rose).

Habits. Even in its slowest movements this active lizard makes no use of its limbs so far as can be seen, the forepart of the body being raised clear of the ground. Its passage through grass is too swift and smooth for the eye to follow (Rose). So snake-like were the motions of one which was encountered gliding over a rock in rocky country, that it was mistaken for a *Psammophis crucifer* (Essex).

Habitat. Occurs chiefly among grass or stones near streams or the sea coast in humid localities (A. Smith).

Localities. **Zululand:** Umfolosi Station (*fide* Boulenger, 1905h). **Natal:** Durban (*fide* Boulenger, 1910b). **Cape Province**[1]**:** Bains Kloof; Bathurst; Caledon Division; Cape Peninsula; Cape Town; Coldspring; Grahamstown; Kaffraria; Kei Road; Kentani; Knysna; Maclear; Mquanduli; Muizenberg; New Brentingville; Ngqeleni; Pondoland; Port Alfred; Port Elizabeth; Range Cottage, Table Mountain; Schoonster's Drift; Swellendam; Tokai; West Hill near Grahamstown; Worcester. (Witte's (1933m) record from Elisabethville, Belgian Congo is tentatively transferred to the northern race *tenuior.* As *C. macrolepis* is the common species of Natal and Zululand it might be advisable to check the identifications of 1905 and 1910 listed above).

Range. Transvaal, Swaziland, and Zululand south to Natal west across Cape Province to Little Namaqualand.

[1] The Irene record of Hewitt was later corrected by him (1911b) to Tokai; that of Little Namaqualand (Boulenger, 1910b) is obviously wrong locality data, for FitzSimons (in *litt.*) informs me that no *Chamaesaura* occurs there.

Chamaesaura anguina tenuior Günther

1895. *Chamaesaura tenuior* Günther, Ann. Mag. Nat. Hist. (6), **15**, p. 524, pl. xxi, fig. 6: Kampala, Uganda.
1896. Tornier, p. 37.
1897. Tornier, p. 64.
1898c. Boulenger, p. 915.
1902d. Boulenger, p. 445 (as *tacnnior*).
1902b. Tornier, p. 582.
1909. Peracca, p. 166 (as *taenuior*).
1912c. Sternfeld, p. 209.
1913c. Nieden, p. 74.
1923a. Loveridge, p. 18.
1923d. Loveridge, p. 850.
1924b. Loveridge, p. 10.
1929h. Loveridge, p. 59.
1930b. Barbour & Loveridge, p. 788.
1936j. Loveridge, p. 297.
1939. Someren, p. 157, pl. A, fig. 2.
1942e. Loveridge, p. 330.
1899c. *Chamaesaura annectens* Boulenger, Proc. Zool. Soc. London, p. 97: Ravine Station, Mau Mountains, 7500 ft., Kenya Colony.
1900b. Tornier, p. 590.
1902d. Boulenger, p. 445.
1908c. Boulenger, p. 5.
1909. Peracca, p. 166.
1911c. Boulenger, p. 162.
1913c. Nieden, p. 74.
1923d. Loveridge, p. 850 (as *annectans*).
1924b. Loveridge, p. 10 (as *annectans*).
?1933m. *Chamaesaura anguina* Witte (not Linné), p. 72.

Native names. Mugoye (Ragoli); *shikoye* (Tereki), *nyarunyansi* (Toro and Wamba).

Description. Rostral in contact with[1], or separated from, the frontonasal; a postnasal; a loreal; a preocular; prefrontals separated by the frontonasal being in contact with the frontal; anterior and posterior pairs of parietals separated by a large interparietal, or the posterior by one or two small scales; fore and hind limbs styliform, undivided, or hind limbs divided, terminating in minute claws, or clawless.

For characters common to all species, see definitlon on p. 98, for scale and pore counts, see statistical table on p. 101.

[1] Tornier (1896) states that this condition obtains in a ♀ from Kavirondo, but that while two of her offspring agree in this respect, in the other embryos the rostral is separated from the frontonasal.

Color. Above, head and back pale or dark brown, latter laterally edged with black forming a pair of dark longitudinal lines; a light vertebral line present or absent; flanks straw color with or without a narrow, longitudinal, white lateral band. Below, whitish or pinkish white.

Size. Total length of type of *tenuior* (Brit. Mus.), 570 (114 + 456) mm., of type of *annectens* (Brit. Mus.), 450+ (150 + 300+) mm., tail reproduced, of a ♀ (M.C.Z. 41101), 637 (135 + 502) mm.

It is interesting to note that in very young embryos the tail is little more than twice the length of head and body, while in adults it is as much as 3.7 times.

Remarks. Günther stated that the fore limb was about equal to the orbit in length, and that the hind limb was not quite twice as long, actually the former's length is contained from once and a half to once and three quarters in the distance from end of snout to anterior corner of orbit, thus differing from typical *anguina* of Southeast Africa where the hind limb about equals or is contained once and a quarter times in the distance from end of snout to anterior corner of orbit. In coloration and other respects there seems little to differentiate the two so I prefer to regard *tenuior* as a northern race.

My reasons for uniting *annectens* with *tenuior* were given (1929h) in detail. In a Kaimosi series both monodactyle and didactyle lizards occurred, some having 24, others 26, midbody scale rows. Nor can Kaimosi be regarded as the meeting place of two forms for apparently the same variation occurs throughout its range.

Breeding. On February 12, at Kaimosi, five females were gravid, two examined held 9 and 10 embryos respectively, one of the latter measured 117 (35 + 82) mm., another lizard held only 6 embryos, one measuring 77 (25 + 52) mm. In June or July, in mountains northwest of Lake Tanganyika, Sternfeld records embryos, the viviparous nature of this race being first recorded by Tornier (1896). On December 12, at Fort Portal, a 138 mm. ♀ held embryos (Loveridge).

Diet. Observed capturing flies and moths, a captive lizard took nymphal grasshoppers (van Someren).

Enemies. Recovered from stomach of Bare-faced Hawk (*Gymnogenys t. typicus*) by van Someren.

Habits. These serpentiform lizards delight to bask on tufts of dry grass into which they dive, or from which they slide to the ground, on being disturbed. If approached quietly, however, it was possible to sweep them up in a butterfly net. Wakamba, who showed no fear of skinks such as *Mabuya striata,* hesitated to catch *tenuior* on account of their serpentiform appearance (van Someren).

Habitat. Grasslands from 3000 to 8000 feet.

Localities. **Uganda:** Fort Portal; Kabulamuliro; Kacheliba; Kampala; Kasiba; Kitende, west of Mbarara; Mabira Forest; Mitiana; Sesse Islands. **Kenya Colony:** Chuyulu Hills; Gilgil (M.C.Z.); Kaimosi; Kossowo; Kwa Raschuongo in Kavirondo; Loita Plains; Mount Kenya; Ravine Station; Ugowe Bay, Kavirondo Gulf; Yala River. **Tanganyika Territory:** Kakutta (1902b) later spelled Kalkutta (1913c) is probably a locality in the western Usambara Mountains where Eggel collected. **Belgian Congo:** ? Elizabethville; Mountains northwest of Lake Tanganyika.

Range. Kenya Colony and northeastern Tanganyika Territory west to Uganda and eastern Belgian Congo.

Chamaesaura miopropus Boulenger

1894e. *Chamaesaura miopropus* Boulenger, Proc. Zool. Soc. London, pp. 724 732: "Fwambo" i.e. Fuambo, Nyasaland.
1900b. Tornier, p. 590.
1911. Sternfeld & Nieden, p. 385.
1913c. Nieden, p. 74.
1923a. Loveridge, p. 18.
1923d. Loveridge, p. 850.
1924b. Loveridge, p. 10.
1933h. Loveridge, p. 302.
1933. Schmidt, p. 10.
1937f. Loveridge, p. 498.
1895a. *Chamaesaura macrolepis* Bocage (not Cope), p. 25.
1937b. Monard, p. 61.

Native names. Nyoka lusagalla (Hehe); *nunduswa* (Kinga); *nombo* (at Galanga: Bocage).

Description. Rostral separated from the frontonasal; a postnasal; an elevated loreal; a preocular; prefrontals separated by the frontonasal being in contact with the frontal; anterior and posterior pairs of parietals separated by a large interparietal; fore limbs a minute clawed vestige; hind limbs styliform, undivided, clawed.

For characters common to all species, see definition on p. 98, for scale and pore counts, see statistical table on p. 101.

Color. Above, head and back pale brown, uniform except for minute black flecks, or like *tenuior* with or without a narrow, longitudinal, white lateral band. Below, whitish or pinkish white.

Size. Total length of type (Brit. Mus.), 550 (120 + 430) mm., of a ♂ (M.C.Z. 30765), 443 (87 + 356) mm., of a ♀ (M.C.Z. 30764), 455 (103 + 349) mm.

Remarks. Schmidt (1933) has suggested the probability that the two Angolan lizards identified as *macrolepis* by Bocage are more probably *miopropus*. Bocage's remarks about the minute fore limbs makes this practically certain. One wonders whether the Elisabethville reptile referred to *anguina* by Witte (1933m), which I have tentatively placed under *a. tenuior*, might not possibly be a *miopropus* also. The high labial count given by me (1933h) for some Tanganyika *miopropus* was due to the inclusion of the subocular and small scales over the gape.

Breeding. On February 8, at Ipemi, a ♀ held several small ova; on April 30, at Igale, another held a single round egg measuring 7 mm. in diameter.

Diet. Black field crickets, grasshoppers, caterpillars and apparently a beetle larva.

Habits. Fond of sunning itself on tussocks of dry grass into which it vanishes with great speed when disturbed.

Habitat. In long dry grass at high altitudes.

Localities. **Tanganyika Territory:** Livingstone Mountains; near Manitete, Unyika; Poroto Mountains — Igale Pass; Ukinga Mountains — Ihenye and Tandala; Uzungwe Mountains —Dabaga and Ipemi. **Nyasaland:** Fuambo (Fwambo). **Angola:** Caconda; Chitau; Galanga (see *Remarks*).

Range. Southern Tanganyika Territory and Nyasaland. Angola.

Chamaesaura macrolepis (Cope)

1862. *Mancus macrolepis* Cope, Proc. Acad. Nat. Sci. Philadelphia, p. 339: Natal.
1885e. *Chamaesaura macrolepis* Boulenger, p. 264.
1898. Sclater, p. 104.
1898. Werner (1896–7; part), p. 141.
1908b. Boulenger, p. 224.
1908. Odhner, p. 3.
1909a. Hewitt, pp. 34, 37.
1910b. Boulenger, p. 470.
1910a. Hewitt, p. 60.
1911b. Hewitt, p. 48.
1913a. Werner, p. 109.
1919. Schmidt, p. 607.
1922. Duerden & Essex, p. 273, fig. 4.
1923. Duerden, p. 362.
1927b. Hewitt, p. 454.
1928a. Essex (1927), p. 884, figs. 3, 6, 18, 19.
1935. *Chamaesaura macropholis* (*sic*) Lawrence, p. 44 (*lapsus*).

Further citations of *macrolepis* will be found under *aenea*, *a. anguina*, and *miopropus*.

Description. Rostral separated from the frontonasal, which may be transversely divided; a postnasal; an elevated loreal[1]; a preocular; prefrontals separated by the frontonasal being in contact with the frontal; anterior, and usually the posterior, pair of parietals separated by a large interparietal; fore limbs absent, hind limbs styliform, undivided, terminating in a minute claw, or clawless.

For characters common to all species, see definition on p. 98, for scale and pore counts, see statistical table on p. 101.

Color. Above, head and back pale brown, a pair of dark, longitudinal dorsal lines; flanks straw color with two longitudinal series of dark dots. Below, whitish.

Size. Total length of ♂ (M.C.Z. 16162), 519 (124 + 395) mm. from Zululand, of unsexed type (A.N.S.P. 9709), 638 (138 + 500) mm. (*fide* Schmidt).

Remarks. Schmidt (1919) describes in detail Philadelphia Academy No. 9709 as type, designating No. 9708 as paratype. Former A.N.S.P. 9713 (now M.C.Z. 17736) is labeled cotype, actually, however, Cope writes in the singular of "this lizard."

Anatomy. Duerden and Essex (1922) discuss the skeletal structure of the limbs, also limb reduction has been studied by Essex who figures different degrees of it in the bones of the hind limb of this species.

Diet. Small orthoptera and spider (in M.C.Z. specimen).

Localities.[2] **Transvaal:** White River, Lydenburg District. **Zululand:** Dukuduku (Indukuduku); Mseleni; Somkele (Mich. Mus.). **Natal:** Durban; Lower Tugela River; Pietermaritzburg.

Range[2]. Southeastern Transvaal, Swaziland, and Zululand south to Natal.

[1] Schmidt writes of two loreals, merely a difference in designation, the anterior being here regarded as a postnasal.

[2] Bocage (1895a) records from Angola are referred to *miopropus*.

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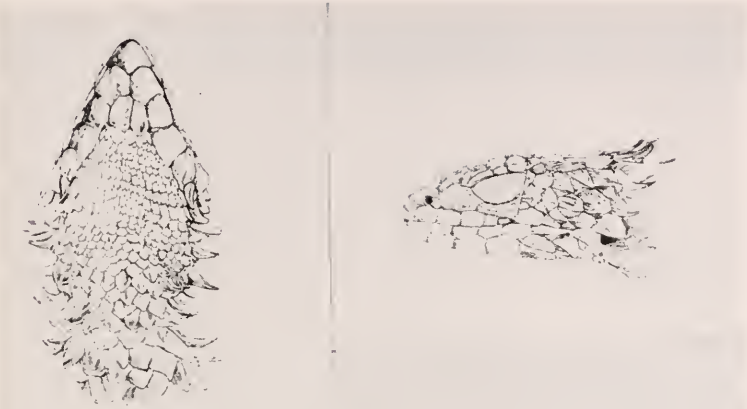
PLATES

PLATE 1

PLATE 1

Fig. 1. *Cordylus giganteus* (Type after Smith).
Fig. 2. *Cordylus giganteus* (Type after Smith).
Fig. 3. *Cordylus w. warreni* (Type after Boulenger).



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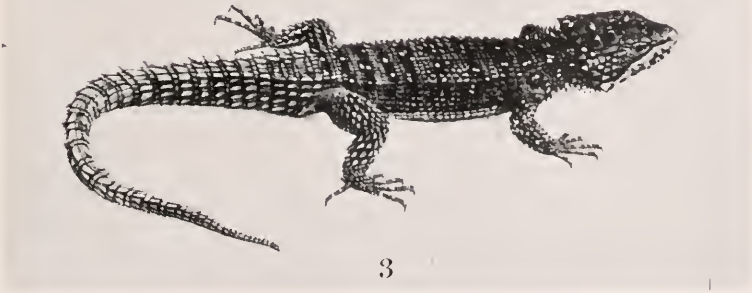


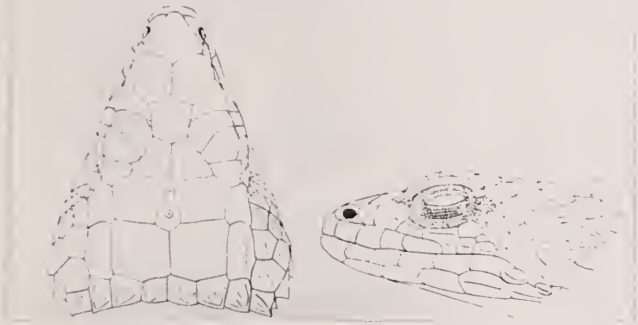
3

PLATE 2

PLATE 2

Fig. 1. *Cordylus warreni perkoensis* (Type after FitzSimons).
Fig. 2. *Cordylus warreni laevigatus* (Type after FitzSimons).
Fig. 3. *Cordylus warreni breyeri* (Type after van Dam).

1



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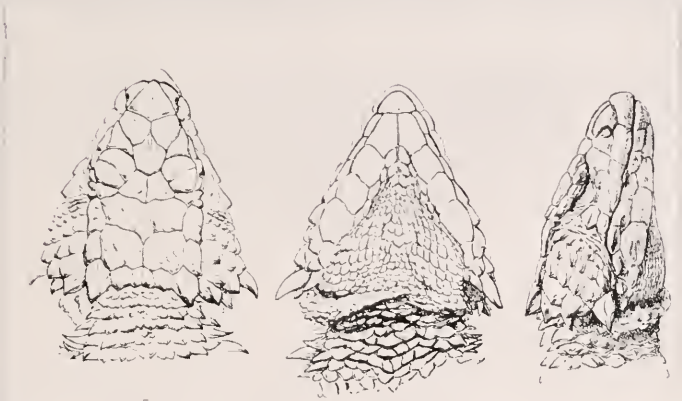

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PLATE 3

PLATE 3

Fig. 1. *Cordylus caeruleopunctatus* (after Power).

Fig. 2. *Cordylus cordylus tropidosternum* (Cope).

a. Type of *frenatus* Pfeffer.

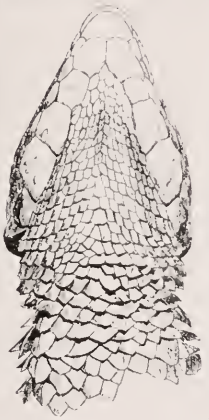
b. Type of *parkeri* Cott.

Fig. 3. *Cordylus c. jonesii* (after Power).

1

a

b



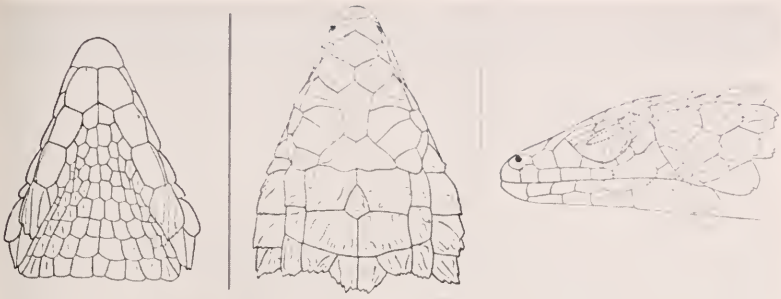
2 *b*

3

PLATE 4

PLATE 4

Fig. 1. *Cordylus cordylus lawrencei* (Type after FitzSimons).
Fig. 2. *Cordylus cordylus tasmani* (Cotype after Power).
Fig. 3. *Cordylus cordylus cordylus* (after Smith as *griseus*).



1

2

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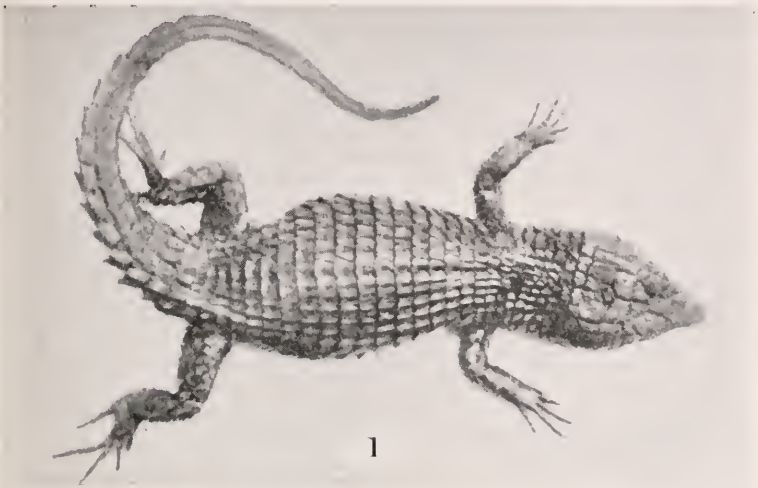
PLATE 5

PLATE 5

Fig. 1. *Cordylus cordylus niger* (Cotype of *atrus* Power).

Fig. 2. *C. peersi* (Type after Hewitt).

Fig. 3. *C. cataphractus* (after Smith).



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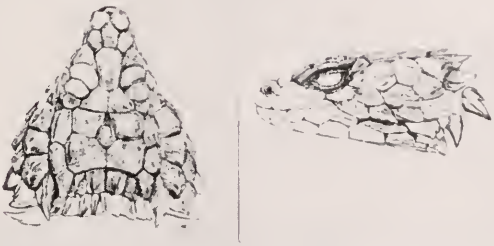

3

PLATE 6

PLATE 6

Fig. 1. *Cordylus cataphractus* (after Smith).

Fig. 2. *C. cataphractus* in defensive attitude (after Rose).

Fig. 3. *C. pustulatus* (after Sternfeld).

Fig. 4. *C. p. polyzonus* (Type after Smith).

1

2

3

4

PLATE 7

PLATE 7

Fig. 1. *Cordylus p. polyzonus* (Type after Smith).

Fig. 2. *Pseudocordylus capensis* (Type after Smith).

Fig. 3. *P. capensis* (Type after Smith).

1

2

3

PLATE 8

PLATE 8

Fig. 1. *Pseudocordylus robertsi* (after Power).

Fig. 2. *P. microlepidotus subviridis* (Cotype after Smith).

Fig. 3. *P. m. subviridis* (Cotype after Smith).

1

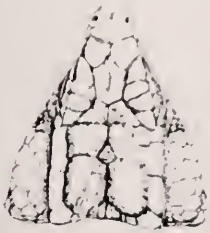

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PLATE 9

PLATE 9

Fig. 1. *Pseudocordylus microlepidotus melanotus* (♂ Cotype after Smith).

Fig. 2. *P. m. melanotus* (♂ Cotype after Smith).

Fig. 3. *P. m. melanotus* (♀ Cotype after Smith).

1

2

3

PLATE 10

PLATE 10

Fig. 1. *Pseudocordylus m. microlepidotus* (Type of *montanus* Smith).

Fig. 2. *P. m. microlepidotus* (Type of *montanus* Smith).

Fig. 3. *P. m. fasciatus* (Type after Smith).

Fig. 4. *P. m. fasciatus* (Type of *algoensis* Smith).

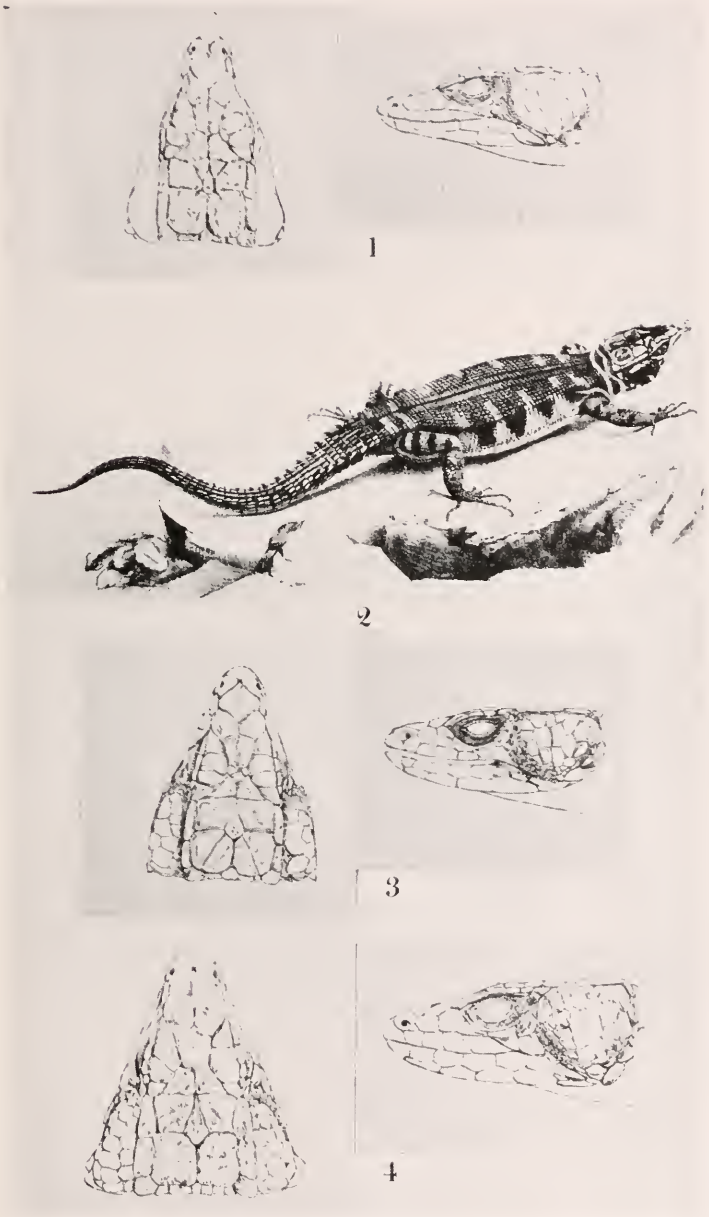

PLATE 11

PLATE 11

Fig. 1. *Pseudocordylus m. fasciatus* (Type of *algoensis* Smith).

Fig. 2. *P. m. fasciatus* (Type after Smith).

Fig. 3. *Platysaurus guttatus torquatus* (Cotype after Peters).

1

2

3

PLATE 12

PLATE 12

Fig. 1. Toe reduction in *Chamaesaura* (after Boulenger).
a. *C. aenea* (Fitzinger).
b. *C. anguina anguina* (Type of *didactyla* Boulenger).
c. *C. macrolepis* (Cope).

Fig. 2. *C. a. anguina* (Type of *didactyla* Boulenger).

Fig. 3. *C. a. anguina* (after Rose).

1

2

3

Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
VOL. XCV, No. 2

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FURTHER REVISIONS OF AFRICAN SNAKE GENERA

BY ARTHUR LOVERIDGE

CAMBRIDGE, MASS., U. S. A.
PRINTED FOR THE MUSEUM
DECEMBER, 1944

PUBLICATIONS

OF THE

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AT HARVARD COLLEGE

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No. 2 — *Further Revisions of African Snake Genera*

By Arthur Loveridge

The miscellaneous genera here assembled are not quite so diverse as may appear at first sight, the majority of them being sylvicoline and largely associated with rain forest. In fact the uniformly black species or races of the four subfossorial genera are sufficiently similar as to be difficult to differentiate in the field, while some have actually been mistaken for burrowing vipers (*Atractaspis*) by several herpetologists of note. The new monotypic genus is erected for a species which occupies a somewhat intermediate position between *Naja* and *Elapsoidea*, having been referred to the former by Werner and Nieden, to the latter by Boulenger and de Witte.

These revisions, with the exception of the last two, were undertaken four years ago during preparation of a report (1942, Bull. Mus. Comp. Zoöl., **91**, pp. 237–373) on the 81 species, or races, of snakes collected during the course of an expedition sponsored by the John Simon Guggenheim Memorial Foundation, to which this Museum is grateful for much of the comparative material which has made these studies possible. There remained, however, certain species or races unrepresented in any American museum, besides questions regarding types which could be satisfactorily settled only by reference to European museums. With this object in view the revisions were put on one side, but as another three years may elapse before conditions are sufficiently settled to deal with such matters, I have thought it better to delay their publication no longer, though the synoptical keys to some were included in the aforementioned report.

Since the Uganda Journal is inaccessible to many herpetologists, I have deviated from usual practice and furnished both page reference to Pitman's articles in the Journal (1935–1938a) as well as the repagination as they appeared in book form (1938b) of his "Guide to the Snakes of Uganda," such being followed in parenthesis by the word 'reprint.' In such cases it is listed under the name or spelling as finally adopted in the concluding parts.

In all other respects the procedure adopted is similar to that outlined in the earlier of half-a-dozen similar revisions published in this Bulletin during recent years (1939–1944). In each I have attempted to assemble all pertinent data and information published since 1880 after allocating it to its subspecies as here recognized. Where an author furnishes a locality record without scale-counts or other data

which would assist in checking his identification, the locality in question is listed under the subspecies within whose range it occurs, usually with footnote or other comment. The generic definitions are substantially those of Boulenger (1894a, 1896d) modified or expanded to include the findings of C. M. Bogert and others.

The opportunity is taken of thanking both Messrs C. M. Bogert (American Museum) and V. FitzSimons (Transvaal Museum) for all the trouble they have taken to supply me with data of specimens in their care, the latter furnishing scale counts of thirty-one *Elapsoidea*, while the former and Messrs K. P. Schmidt and C. H. Pope (Chicago Natural History Museum) leave me indebted for the loan of material.

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* Represented in the collections of the Museum of Comparative Zoölogy: examples of species or forms without asterisk are earnestly desired.

Genus RHAMNOPHIS

1862b. *Rhamnophis* Günther, Ann. Mag. Nat. Hist. (3), **9**, p. 129, pl. x (type *aethiopissa* Günther).

1864b. *Crypsidomus* Günther, Proc. Zool. Soc. London, p. 309 (substitute name).

Maxillary teeth 17–35, followed after an interspace by 3 enlarged ones; anterior mandibular teeth slightly enlarged. Head rather short, distinct from neck; eye very large, with round pupil; nasal divided or semi-divided; a loreal; a preocular[1]. Body compressed; scales oblique, narrow, smooth, with apical pits, in 13–19 rows of which the vertebral is distinctly enlarged; ventrals rounded or obtusely keeled laterally. Tail long; subcaudals in two rows.

Range. Africa in forested areas of equatorial belt from French Guinea to western Kenya Colony.

Remarks. The substitute name *Crypsidomus* was proposed by Günther in the mistaken belief that his *Rhamnophis*, 1862, was preoccupied by *Rhamphiophis* Peters, 1854. It is by no means sure that *Rhamnophis* should not be united with *Thrasops* Hallowell, 1857, with which it has been confused, and from which it is barely separable.

The above description is largely that of Boulenger (1896d, p. 632) after exclusion of the keeled-scaled *Thrasops jaeksonii*, and extension of the maxillary tooth count resulting from the inclusion of *batesii*, together with notes on its dentition kindly supplied me by Bogert in 1940.

Key to the Species

1. Midbody scale-rows 13; anal entire; subcaudals less than 116; maxillary teeth 30+3 to 35+3 ..... *batesii* (p. 125)

   Midbody scale-rows 15–19; anal divided; subcaudals more than 116; maxillary teeth 17+3 to 20+3 2

2. Midbody scale-rows 17, very rarely 15, 16, or 19; lower postocular in contact with 3 upper labials; range: French Guinea east to the western Belgian Congo ..... *a. aethiopissa* (p. 126)

   Midbody scale-rows 15, very rarely 17; lower postocular in contact with 2 or 3 upper labials; range; eastern Belgian Congo to western Kenya Colony 3

3. Subcaudals 134–150; normally upper labials 8, sometimes 7; range: Ituri region of eastern Belgian Congo ..... *a. ituriensis* (p. 128)

[1] Rarely 2, *fide* Werner.

Subcaudals 117–138; normally upper labials 7, sometimes 6 or 8; range: western Uganda to western Kenya Colony..... *a. elgonensis* (p. 129)

Rhamnophis batesii (Boulenger)

1908a. *Thrasops batesii* Boulenger, Ann. Mag. Nat. Hist. (8), **2**, p. 93: Akok and Efulen, French Cameroon.
1909b. Sternfeld, p. 16.
1919b. Boulenger, p. 283.
1929a. Werner, p. 97.
1923. *Rhamnophis batesii* Schmidt, p. 83, fig. 5.

Description. Rostral twice as broad as deep, just visible from above; nasal divided or semidivided; internasals as broad as long, about as long as the prefrontals; frontal bell-shaped, once and a half to twice as long as broad (in the middle), longer than its distance from the end of the snout, as long as, or a little longer or shorter than, the parietals, as broad as a supraocular; loreal longer than deep; preocular 1, in contact with or separated from the frontal; eye very large, its diameter much greater than its distance from the mouth, postoculars 3, the lowest in contact with 3 upper labials; temporals 1, or 1+1 and occipital; occipitals 4; upper labials 7 or 8, the fourth and fifth or fifth and sixth entering the orbit; 4–6 lower labials in contact with the anterior sublinguals, which are about as long as the median pair. Midbody scales in 13 rows, smooth, oblique, the vertebral row enlarged; ventrals 163–177; anal entire; subcaudals 91–114 pairs.

Dentition. Boulenger found about 30+3 maxillary teeth, Bogert — for Ituri specimens — 35+3, the enlarged posterior ones separated by a diastema from the subequal anterior teeth.

Color. Above, pale brown or pea green, each scale edged or striped with black and spotted with lighter which may form irregular or interrupted crossbands; labials edged with black posteriorly. Below, white anteriorly with scattered black spots, brown or olive posteriorly blotched with darker.

For further notes on color, see Schmidt (1923, p. 84).

Size. Total length of ♂ (M.C.Z. 38393), 1217 (827 + 390) mm. from Batouri district, Cameroon, surpassed by that of an unsexed cotype (Brit. Mus.) of 1800 (1450 + 350 mm.)

Localities. **French Cameroon:** Akok; Batouri district; Efulen; Ja River district. **Belgian Congo:** Gamangui; Niapu.

Range. French Cameroon east to the Ituri region, Belgian Congo.

Rhamnophis aethiopissa aethiopissa Günther

1862b. *Rhamnophis aethiopissa* Günther, Ann. Mag. Nat. Hist. (3), **9** p. 129, pl. x: West Africa.
1884a. Rochebrune, p. 176, pl. xix, fig. 1 (ignored).
1875a. *Rhamnophis aethiops* Peters, p. 199.
1876a. Peters, p. 119.
1896d. Boulenger, p. 632.
1897b. Mocquard, p. 13.
1897. Sjöstedt, p. 35.
1897b. Werner, p. 399.
1898a. Werner, p. 210.
1899a. Werner, p. 138.
1900b. Boulenger, p. 453.
1902a. Werner, p. 344.
1906i. Boulenger, p. 213.
1906. Johnston, p. 832.
1909. Gendre, p. cvi (as *Rhaumophis*).
1915a. Boulenger, p. 207.
1917. Chabanaud, p. 372.
1917b. Chabanaud, p. 11.
1919b. Boulenger, p. 284.
1919g. Boulenger, p. 23.
1922. Aylmer, p. 15.
1927d. Witte, p. 324.
1933f. Angel, p. 118, figs. 43–43a (*not* 44–44a; captions transposed).
1933m. Witte, p. 90.
1888a. *Crypsidomus aethiops* Boettger, p. 64.
1890. *Crypsidomus aethiopissa* Büttikofer, p. 478.
1891b. *Chrysidomus aethiops* Matschie, p. 616.
1892. Zenker, p. 183.
1893c. Matschie, p. 212.
1901. *Thrasops splendens* Andersons, Bihang Till K. Svenska Vet.-Akad. Handl., **27**, No. 5, p. 11, pl. i, fig. 8: Bibundi and Mapanja, British Cameroon.
1908a. *Thrasops aethiops* Sternfeld, pp. 409, 425.
1908b. Sternfeld, pp. 215, 230.
1909a. Sternfeld, p. 15.
1909b. Sternfeld, p. 17.
1910. Müller, p. 602.
1911. Lampe, p. 194.
1929a. Werner, p. 97.
1941e. *Rhamnophis aethiopissa aethiopissa* Loveridge, p. 121.

Further citations of '*aethiops*' will be found under *a. ituriensis*.

Description. Rostral twice as broad as deep, visible from above; nasal divided or semidivided; internasals as broad as long, about as long as the prefrontals; frontal bell-shaped, twice as long as broad (in the middle), as long as, or slightly longer than, its distance from the end of the snout, as long as, or a little shorter than, the parietals, as broad as a supraocular; loreal longer than deep; preocular 1, rarely 2,[1] in contact with or separated from the frontal; eye very large, its diameter much greater than its distance from the mouth; postoculars 2, rarely 3 or 4,[1] the lower in contact with 3 upper labials; temporals 1, or 1 + 1 and occipital (or 1 + 2, *fide* Boulenger); occipitals 2, usually present; upper labials 8, the fourth and fifth, rarely fourth, fifth and sixth, entering the orbit; 4 or 5 lower labials in contact with the anterior sublinguals, which are shorter than the median pair. Midbody scales in 17, rarely 15 (French Congo, *fide* Angel) 16 (Liberia, *fide* Loveridge) or 19 (French Cameroon, *fide* Müller) rows, smooth, oblique, the vertebral row enlarged; ventrals 158–179; anal divided; subcaudals 139–159 pairs.

Dentition. 19 or 20 + 3 maxillary teeth, the enlarged posterior ones separated by a diastema from the subequal anterior teeth.

Color. Above, green, each scale heavily edged with black; head pale olive, the shields usually spotted and edged with black; five broad black lines on tail. Below, pale olive or yellow with a light line along either lateral angle; outer ends of ventrals green edged with black; tail with a narrow, median, black line and edged with black laterally.

Size. Total length of ♂ (cotype of *splendens* in Stockholm Museum). 1330 (855 + 475) mm. from British Cameroon; of ♀ (cotype Stock, Mus. 1979) 1470 (950 + 520) mm. from Bibundi, British Cameroon;. both surpassed by Boulenger's unsexed record of 1500 (970 + 530) mm.

Remarks. Angel (1933f, p. 118) has synonymized *ituriensis* with *aethiopissa* on account of the occurrence in the French Congo of a specimen with 15 midbody scale-rows. The incidence is so slight, however (*circa* 3%) as not to invalidate the recognition of *ituriensis* as a race within whose range 10% may have 17 midbody scale-rows. In passing, it might be pointed out that the captions under the figures of *T. jacksonii* and *R. aethiops* have been transposed.

Localities. **Senegal** ? (*fide* Rochebrune). **French Guinea:** Ditinn (Ditiun). **Sierra Leone. Liberia:** Harbel. **Gold Coast:** Accra. **Togo:** Adele (Bismarckburg); Kete; Misahohe. **Nigeria:** Lagos. **British Cameroon:** Bibundi; Buea; Isongo; Mapanja;

[1] *fide* Werner.

Victoria. **French Cameroon:** Batouri district; Bipindi; Dehane; Dibongo near Edea; Longji; Yaundeland. **Fernando Po. French Congo:** Lambarene; Ogowe. **Belgian Congo:** Banziville; Makaia Ntete; Umangi.

Range. French Guinea east to the western Belgian Congo.

Rhamnophis aethiopissa ituriensis Schmidt

1919g. *Rhamnophis aethiops* Boulenger (part), p. 23.
1934a. Schwetz, pp. 381, 383.
1923. *Rhamnophis ituriensis* Schmidt, Bull. Am. Mus. Nat. Hist., **49**, p. 81, fig. 4: Niapu, Belgian Congo.
1933m. Witte, p. 90.
1936. Pitman (part), p. 49 (but not plates).
1938b. Pitman (part), p. 104 (but not plates, reprint).
1929a. *Thrasops ituriensis* Werner, p. 97.

Further citations of '*ituriensis*' will be found under *a. elgonensis.*

Description. Rostral about twice as broad as deep, just visible from above; nasal divided; internasals as broad as long, about as long as the prefrontals; frontal bell-shaped, once and three-quarters as long as broad (in the middle), as long as its distance from the end of the snout, slightly shorter than the parietals, as broad as a supraocular; loreal longer than deep; preocular 1, in contact with or separated from the frontal; eye very large, its diameter much greater than its distance from the mouth; postoculars 2, rarely 3 or 4, the lower in contact with 2 upper labials; temporals 1, or 1 + 1 and occipital; occipitals 2, rarely 3; upper labials 7, rarely 6 or 8, the fourth and fifth entering the orbit; 4 or 5 lower labials in contact with the anterior sublinguals, which are shorter than the median pair. Midbody scales in 15, rarely 17, rows, smooth, oblique, the vertebral row enlarged; ventrals 159–172; anal divided; subcaudals 134–150 pairs.

Color. Above, green (bluish black in alcohol), each scale edged or striped with black and spotted or striped with lighter; five broad black lines on tail. Below, chin and throat yellowish, rest olive with a light line along either lateral angle, a black spot either adjacent to this line or at the outer end of the ventrals; tail with a narrow, median, black line and edged with black laterally.

Size. Total length of type ♂ (A.M.N.H. 12505), 1305 (865 + 440) mm. of paratype ♀ (A.M.N.H.), 1290 (832 + 458) mm. both from Niapu.

Parasites. Hemogregarines reported from a Stanleyville snake by Schwetz.

Localities. **Belgian Congo:** Gamangui; Medje; Niangara; Niapu; Stanleyville. (Reported from Uganda in error by Pitman).

Range. Eastern Belgian Congo.

Rhamnophis aethiopissa elgonensis Loveridge

1916a. *Thrasops rothschildi* Loveridge (not Mocquard), pp. 79, 84.
1923e. Loveridge (part), p. 879 (Yala specimens only).
1929h. *Rhamnophis aethiopissa elgonensis* Loveridge, Bull. U. S. Nat. Mus. **151**, p. 24: Yala (= Lukosa) River, Kenya Colony.
1937f. Loveridge, p. 502.
1938a. Pitman, p. 210.
1938b. Pitman, p. 308 (reprint).
1942e. Loveridge, p. 276.
1936. *Rhamnophis ituriensis* Pitman (part), p. 49, pl. vi. fig. 6, pl. T, fig. 3.
1938a. Pitman, pp. 210, 231.
1938b. Pitman, pp. 104–106, 308, 329, pls. as above (reprint).

Description. Rostral once and two-thirds to twice as broad as deep, visible from above; nasal divided (its posterior half fused with loreal only in the type specimen); internasals broader than long (in young) or as broad as long (in adults), about as long as the prefrontals; frontal bell-shaped, once and a half as long as broad (in the middle), as long as (adult) or much longer than (young) its distance from the end of the snout, noticeably shorter than the parietals, much broader than a supraocular; loreal longer than deep; preocular 1, in contact with or separated from the frontal; eye very large, its diameter much greater than its distance from the mouth; postoculars 2, the lower in contact with 2 upper labials; temporals 1, or 1 + 1, or 1 + 1 and occipital; occipitals 2; upper labials 7, rarely 5, 6 or 8, the fourth and fifth or third and fourth entering the orbit; 4 or 5 lower labials in contact with the anterior sublinguals, which are shorter than the median pair. Midbody scales in 15 rows, smooth, oblique, the vertebral row enlarged; ventrals 154–164; anal divided; subcaudals 117–138 pairs.

Color. Above, green, each scale edged with black; head olive, uniform or the shields edged with black, upper labials pale green anteriorly and yellowish posteriorly in their upper portion, blue below; five broad black lines on tail. Below, ventrals greenish flecked with white, a brown line along either lateral angle, outer ends of ventrals

pale olive green, tail with a median dusky line flanked by irregular dark flecks.

The above was based on notes made in the field of a snake from Kibale Forest. For further notes on color, see Pitman (1938b, p. 105, and col. pl. T, fig. 3) under name of *"ituriensis"*.

Size. Total length of ♂ 1255 (825 + 430) mm. from Budongo Forest (Pitman); of type ♀ (M.C.Z. 18198), 1147 (760 + 387 mm.) from Yala River.

Localities. **Uganda:** Budongo Forest; Kajansi Forest; Kibale Forest; Mabira Forest. **Kenya Colony:** Kaimosi; Kakamega; Yala River.

The last three localities are really one, Kaimosi being only an hour's walk from the Yala River flowing through the Kakamega Forest, which is an outlier of the Elgon Forest. The species has not as yet been taken on Mount Elgon.

Range. Western Uganda to western Kenya Colony.

Genus Thrasops

1857. *Thrasops* Hallowell, Proc. Acad. Nat. Sci. Philadelphia, p. 67 (type *Dendrophis flavigularis* Hallowell).

Maxillary teeth 17–18, followed after an interspace by 3–4 enlarged ones; anterior mandibular teeth slightly enlarged. Head rather short, distinct from neck; eye large, with round pupil; nasal divided, semi-divided, or entire; a loreal; 1 or 2 preoculars. Body more or less compressed; scales oblique, strongly imbricate, smooth in young, at least the median ones keeled in adults, with apical pits, in 13–21 rows; ventrals rounded or with a discontinuous lateral keel. Tail long; subcaudals in two rows.

Range. Africa in forested areas of equatorial belt from French Guinea east to central Kenya Colony.

Remarks. It is possible that the so-closely related genus *Rhamnophis* Günther, 1862, may ultimately have to be united with *Thrasops*. Schmidt (1923, p. 83), however, states that in *R. a. ituriensis* the hemipenis has four large spines about its base, the remainder being calyculate, while in *T. j. jacksonii* the hemipenis ls heavily spinose on one side for its entire length. The hemipenes of both *T. j. jacksonii* and *T. flavigularis* have been described in detail by Bogert (1940, pp. 58, 59) who finds them almost identical in structure.

Key to the Species

1. Three labials in contact with the lower postocular; midbody scale-rows 15–19; ventrals 175–187; subcaudals 120–140; range: French Guinea east to Togo ..... *occidentalis* (p. 131)

   Two, very rarely 3, labials in contact with the lowest postocular; range: Nigeria east to Kenya 2

2. Midbody scale-rows 13–15; the dorsals much longer than the ventrals; range: Nigeria south to Cabinda and western Belgian Congo *flavigularis* (p. 132)

   Midbody scale-rows 17–21; the dorsals not or but slightly longer than the ventrals; range: central Belgian Congo east to Kenya Colony 3

3. Midbody scale-rows 19, rarely 17 or 21; ventrals 187–211; range: central Belgian Congo east to western Tanganyika Territory and western Kenya Colony ..... *j. jacksonii* (p. 134)

   Midbody scale-rows 17; ventrals 170–178; range: Mount Kenya to Nairobi in Central Kenya Colony ..... *j. schmidti* (p. 137)

Thrasops occidentalis Parker

1894a. *Thrasops flavigularis* Boulenger (part), p. 105.
1906. Johnston, p. 832.
1909. Gendre, p. cvi.
1915a. Boulenger (part), p. 206.
1919b. Boulenger (part), p. 283.
1922. Aylmer, pp. 15, 19.
1929a. Werner (part), p. 97.
1933f. Angel (part), p. 115.
1908b. *Thrasops jacksoni* Sternfeld (not Günther), pp. 215, 230, figs, 2–3.
1909a. Sternfeld, p. 16, figs. 21–22.
1929a. Werner (part), p. 98.
1915a. *Rhamnophis jacksonii* Boulenger (part), p. 207.
1915c. Boulenger (part), p. 624.
1919b. Boulenger (part), p. 284.
1919g. Boulenger (part), p. 23.
1922. Aylmer, p. 15.
1940a. *Thrasops occidentalis* Parker, Ann. Mag. Nat. Hist. (11), **5**, p. 273, figs. 1 and 2a: Axim, Gold Coast.

Description. Rostral subquadrangular, a little broader than deep, visible from above; nasal divided; internasals as long as the prefront-

als; frontal slightly longer than broad, longer than its distance from the rostral (in adult), longer than its distance from the end of snout (in young), slightly shorter than the parietals; no enlarged occipitals; loreal present; preocular 1, separated from the frontal; eye large, its diameter much greater than its distance from the mouth; postoculars 3, lowest in contact with 3 upper labials; temporals 1 + 1; upper labials 8, rarely 7, the fourth and fifth entering the orbit; 4 lower labials in contact with the anterior sublinguals, which are shorter than the posterior. Midbody scales in 15–19 rows, not longer than the ventrals, at least the median rows keeled in adults though all may be smooth in young; ventrals 175–187; anal divided; subcaudals 120–140 pairs.

Color. Above, in adults, black; in young, head and neck olive, sides of head whitish, the sutures between the scales picked out in black, dorsum chequered with subrectangular black and yellow spots arranged in 6 to 8 longitudinal rows. Below, in adults, chin and throat straw colored, otherwise dark olive; in young, chin and throat whitish, belly black, the ventrals with alternately two or three transversely oval yellow spots; subcaudals yellow margined with black.

Size. Total length of paratype ♂ (B.M. 66.1.28.6), 1165 (670 + 495) mm. from Sierra Leone; of ♀ holotype (B.M. 1911.6.30.2), 1085 (682 + 403) mm. from Axim, Gold Coast.

Remarks. In the absence of material, I have based the above description on that of Parker, supplemented by such additional data as is to be found in the literature cited above.

Localities. **French Guinea:** Ditinn (Diteien); Labe; Yambering. **Sierra Leone. Liberia:** Monrovia. **Gold Coast:** Axim; Dunkwa. **Togo:** Misahöhe.

Range. French Guinea east to Togo (Rochebrune's (1884a, pp. 174, 176) records of *niger* and *flavigularis* from Senegambia are questionable and omitted).

Thrasops flavigularis (Hallowell)

1852b. *Dendrophis flavigularis* Hallowell, Proc. Acad. Nat. Sci. Philadelphia, p. 205: "Liberia" later corrected to Gaboon.
1857. Hallowell, p. 66.
1857. *Thrasops flavigularis* Hallowell, p. 67.
1877c. Peters, p. 615.
1888a. Boettger, p. 63 (inc. var. *pustulata*).
1889. Boettger, p. 279 (inc. var. *pustulata*).
1889. Hesse, p. 267.
1894a. Boulenger (part), pp. 105, 358.

1895a. Bocage, p. 97.
1897b. Boulenger, p. 278.
1897. Sjöstedt, p. 35.
1898. Boettger, p. 59.
1898a. Werner, p. 208.
1899a. Werner, p. 138.
1900b. Boulenger. p. 453.
1902a. Werner, p. 344.
1905f. Boulenger, p. 185.
1906i. Boulenger, p. 213.
1908a. Sternfeld, pp. 408, 425.
1909b. Sternfeld, p. 16, figs, 18–19.
1911. Lampe, p. 194.
1915a. Boulenger (part), p. 206.
1919b. Boulenger (part), p. 283.
1927d. Witte, p. 324.
1929a. Werner (part), p. 97.
1933f. Angel (part), p. 115.
1933m. Witte, p. 90.
1938b. Mertens, p. 47.
1940. Bogert, p. 58.
1940a. Mertens, p. 241.
1940a. Parker, p. 271, fig. 2b.
1872a. *Hapsidophrys niger* Günther, Ann. Mag. Nat. Hist. (4), **9**, p. 25: Gaboon.
1875a. *Thrasops pustulatus* Buchholz & Peters, Monatsb. Akad. Wiss. Berlin, p. 199: Mungo, British Cameroon.
1876a. Peters, p. 119.

For other citations see *occidentalis* with which it has been long confused.

Native name. Mduma (near Banana, *fide* Hesse).

Description. Rostral subquadrangular, about once and a third to once and a half as broad as deep (in the middle), visible from above; nasal divided, semidivided or entire; internasals broader than long (in young) or as broad as long (in adults), about as long as the prefrontals; frontal once and two-thirds to twice as long as broad (in the middle), as long as its distance from the rostral (adult) or longer than its distance from the end of the snout (young), as long as the parietals; as broad as, or narrower than, a supraocular; loreal present; preocular 1, rarely 2, separated from the frontal; eye large, its diameter much greater than its distance from the mouth; postoculars 3, the lowest in contact with 2, very rarely 3, upper labials; temporals 1 + 1; upper

labials 8, rarely 9, the fourth and fifth or rarely fifth and sixth entering the orbit; 3–5 lower labials in contact with the anterior sublinguals, which are shorter than the posterior. Midbody scales in 13 or 15 rows, much longer than the ventrals, at least the median dorsals keeled in adults, all smooth in young; ventrals 196–215; anal divided; subcaudals 128–146 pairs.

Anatomy. Both dentition and hemipenes are discussed under the generic definition.

Color. Above, in adults, uniformly black with a silken lustre; in half-grown or young, dark brown or dark olive, the neck yellow with black-tipped scales and orange on the sides, dorsum chequered with black and yellow spots, the former predominating. Below, in adults, black, though paler than dorsum, uniform, or the throat yellowish, grayish, or brownish white; in half-grown or young, chequered black and yellow on belly, with roundish yellow spots disposed alternately on the inner and outer part of successive scales on belly and tail.

Boettger (1889, p. 279) also furnishes detailed color descriptions.

Size. Total length of unsexed record 2000 (1440 + 560) mm. from Isongo (*fide* Lampe); of ♀ (type of *niger*, Brit. Mus.), 1552 (1120 + 432) mm. from Gaboon.

Diet. Mammal remains in a Metet snake (Bogert); a chameleon (*C. gracilis etiennei*) in a Povo Nemlao reptile. (Boettger).

Habitat. Arboreal in primary forests.

Localities. **Nigeria. British Cameroon:** Bibundi; Bota; Buea; Isongo; Mungo; Tiko; Victoria. **French Cameroon:** Bipindi; Dehane; Ebolowa; Kribi; Metet; Pungo Songo; Sakbayeme; Yaunde. **Fernando Po:** Moka. **Spanish Guinea. French Congo:** Gaboon; Loango River. **Belgian Congo:** Bikori (? Bikoro); Ganda Sundi; Kwango (Kuango) River; "Mayon"; Povo Nemlao nr. Banana; Temvo nr. Mayumbe; Vista. **Cabinda:** Chinchoxo.

Range. Nigeria south to Cabinda and western Belgian Congo (Records of *flavigularis* and *jacksonii* from west of Nigeria are referable to *occidentalis* Parker, 1940).

Thrasops jacksonii jacksonii Günther

1895. *Thrasops Jacksonii* Günther, Ann. Mag. Nat. Hist. (6), **15**, p. 528: Kavirondo, Kenya Colony.
1910a. Sternfeld, p. 20, figs. 18–19.
1923. Schmidt, p. 85. fig. 6.

1924b. Loveridge, p. 5.
1928j. Loveridge, p. 75.
1929a. Werner, p. 98.
1933f. Angel, p. 116, figs. 44–44a (*not* 43–43a; captions transposed).
1940a. Parker, p. 271, fig. 3.
1896d. *Rhamnophis jacksonii* Boulenger, p. 632.
1902a. Boulenger, p. 446.
1909. Peracca, p. 172.
1911c. Boulenger, p. 165.
1912. Hobley, p. 49.
1915a. Boulenger (part), p. 207.
1915c. Boulenger (part), p. 624.
1916a. Loveridge, p. 84.
1919b. Boulenger (part), p. 284.
1919g. Boulenger (part), p. 23.
1923e. Loveridge (part), p. 879.
1933m. Witte, p. 90 (but Temvo record should be checked).
1934a. Schwetz, pp. 381, 383.
1934b. Schwetz, p. 24.
1905b. *Thrasops Rothschildi* Mocquard, Bull. Mus. Hist. Nat. Paris, **11**, p. 287: "Afrique orientale anglaise."
1915c. Boulenger, p. 624.
1923e. Loveridge (part), p. 879.
1929a. Werner, p. 97.
1936j. *Thrasops jacksonii jacksonii* Loveridge, p. 249.
1936. Pitman, p. 52, pl. vii, fig. 1, pl. G, fig. 4.
1937c. Loveridge, p. 274.
1937f. Loveridge, p. 502.
1938a. Pitman, pp. 210, 231.
1938b. Pitman, pp. 39, 107, 308, 329, pls. and figs. as above (reprint).
1940. Bogert, p. 58.
1942e. Loveridge, p. 277.

Further citations of '*jacksonii*' and '*rothschildi*' will be found under *Rhamnophis a. elgonensis*, *T. occidentalis* and *T. j. schmidti*.

Native names. *Mambala* (at Stanleyville, *fide* Schwetz); *wahimbiri* (Wamba and Toro); *ntemankima* (Ganda); *isilukanga* (Gishu for olivaceous halfgrown examples); *yakobe* (Gishu for black adults). Probably confused with *Dispholidus typus*.

Description. Rostral subquadrangular, about once and a quarter to once and a half as broad as deep (in the middle), visible from above; nasal divided, semidivided or entire; internasals broader than long (in young) or as broad as long (in adults), about as long as the prefrontals;

frontal once and a third to twice as long as broad (in the middle), as long as, or longer, or shorter than, the parietals; as broad as, or broader than, a supraocular; loreal present; preoculars 1 or 2, separated from, or in contact with, the frontal; eye large, its diameter much greater than its distance from the mouth; postoculars 3, rarely 4, the lowest in contact with 2, very rarely 3, upper labials; temporals 1 + 1; upper labials 8, rarely 9, the fourth and fifth or rarely fifth and sixth entering the orbit; 4 or 5 lower labials in contact with the anterior sublinguals, which are subequal to, or shorter than, the posterior. Midbody scales in 17 or 19, very rarely 21, rows, not or but scarcely longer than the ventrals, at least the median dorsals keeled in adults (probably all smooth in young); ventrals 187–211; anal divided; subcaudals 130–155 pairs.

Dentition. Maxillary teeth 18, subequal, followed after a diastema by 3 enlarged ones (Bogert, based on snakes from Kampala and Lukolela).

Anatomy. The hemipenes are described by Bogert, as follows: "Everted on the Lukolela specimen, single, sulcus undivided. Greatly enlarged basal spines decreasing in size distally and merging into fringed reticulate calyces at the end. The organ appears to be nearly identical with that of *T. flavigularis.*" (*vide ante*).

Color. Above, in adults, uniformly black with a silken lustre; in halfgrown or young, dark brown or dark olive, the neck yellow with black-tipped scales and orange on the sides; dorsum chequered with black and yellow spots, the former predominating. Below, in adults, black, though paler than dorsum, uniform, or the throat yellowish, grayish, or brownish white; in halfgrown or young, chequered black and yellow on belly, with roundish yellow spots which are sometimes disposed alternately on the inner and outer part of successive subcaudals.

Size. Total length of ♂ (A.M.N.H. 12288), 1900 (1320 + 580) mm.; of ♀ (A.M.N.H. 12290), 2160 (1550 + 610) mm., both from the Belgian Congo (*fide* Schmidt).

Breeding. At Sipi and Butandiga on the western slopes of Mt. Elgon, four gravid females were taken between December 14, 1933 and January 11, 1934. The number of eggs varied from 7 to 12, average 9, and in size ranged from 19 x 8 mm. to 35 x 8 mm. (Loveridge).

Diet. Mammals, such as the tree rat (*Oenomys h. editus*), a bird, lizard (*Agama atricollis*) and chameleons (*C. senegalensis, C. h. bitaeniatus* and *C. h. höhnelii*) were found in their stomachs (Loveridge).

Parasites. Hemogregarines in Stanleyville snakes (Schwetz), and ticks on Uganda specimens (Pitman).

Defence. According to Christy this snake distends its neck like a cobra. If confirmed, it is probably achieved by inflation as is practised by the Boomslang (*Dispholidus typus*) to whose black phase *T. j. jacksonii* bears so striking a resemblance that it deceives even herpetologists. The snake described as *T. j. mossambicus* by Mertens, was only a Boomslang, whose grooved teeth were overlooked.

Habitat. Found in primary forest, being essentially an arboreal species.

Localities. **Belgian Congo:** Albertville; Avakubi; Bosabangi; Buta; Diambo; Eala; Kasai basin; Leopoldville; Lukolela; Medje; Niangara; Temvo (*fide* Witte); Upper Mulinga on Idjwi Id., Lake Kivu. **Tanganyika Territory:** Kabare near Bukoba. **Uganda:** Bundibugyo; Bussu; Butandiga; Entebbe; Fort Portal; Jinja; Kampala; Kilembe; ? Kitala; Mabira Forest; Sipi; Toro. **Kenya Colony:** Kaimosi; Kakamega; Kavirondo; Yala River.

Range. Central Belgian Congo east to western Tanganyika Territory and western Kenya Colony.

Thrasops jacksonii schmidti Loveridge

1911. *Thrasops rothschildi* Lönnberg (not Mocquard), p. 22.
1912. Hobley, p. 49.
1928j. *Thrasops jacksonii* Loveridge (part), p. 75.
1923e. Loveridge, p. 879.
1936f. *Thrasops jacksonii schmidti* Loveridge, Proc. Biol. Soc. Washington, **49**, p. 63: Meru Forest, Mount Kenya, Kenya Colony.

Description. Rostral subquadrangular, about once and a third as broad as deep (in the middle), visible from above; nasal divided; internasals broader than long (in halfgrown), about as long as the prefrontals; frontal twice as long as broad (in the middle), longer than its distance from the rostral (halfgrown), as long as the parietals, as broad as a supraocular; loreal present; preocular 1, separated from the frontal; eye large, its diameter much greater than its distance from the mouth; postoculars 3, the lowest in contact with 2 upper labials; temporals 1 + 1; upper labials 8, the fourth and fifth entering the orbit; 4 or 5 lower labials in contact with the anterior sublinguals, which are shorter than the posterior. Midbody scales in 17 rows, not or scarcely longer than the ventrals, faintly keeled (in halfgrown); ventrals 170–178; anal divided; subcaudals 140–144 pairs.

Color. Above, in adults, uniformly black with a silken lustre; in halfgrown type, brownish olive. Below, in adults, black; in halfgrown type, grayish white becoming gray beneath tail with a median darker gray line posteriorly.

Size. Total length of type ♂ (M.C.Z. 9276), 1065 (700 + 365) mm. from Meru Forest; of ? ♀ (Nairobi Museum), 2255 (1671 + 584) mm. from Muthaiga. That is to say, almost 7½ feet.

Localities. **Kenya Colony:** Meru Boma and Forest; Muthaiga, near Nairobi.

Range. Central Kenya Colony.

Genus Duberria

1826. *Duberria* Fitzinger (part), Neue Class. Rept., p. 29 (type *Coluber canus* Linnaeus "und Consorten").
1830. *Homalosoma* Wagler, Syst. Amphib., p. 190 (n.n. for *Duberria*).
1894a. Boulenger, p. 274, fig. 19.

Maxillary short, with 10–12 teeth, subequal; anterior mandibular teeth longest. Head small, not distinct from neck; eye small, with round pupil; nasal entire or very rarely semidivided; loreal small or absent; 1, very rarely 2, preoculars. Body cylindrical, short; scales smooth, with apical pits, in 15, very rarely 16, rows; ventrals rounded. Tail short; subcaudals in two rows.

Range. East and Central Africa from Ethiopia and Uganda (chiefly in montane grasslands of equatorial belt) southwards to the Cape (but not recorded from Angola and South West Africa).

Remarks. Boulenger (1894a), who should be consulted for further generic synonymy, correctly followed Cope (1864) in using *Pseudaspis* Fitzinger (1843) for *Coluber canus* Linnaeus (1758) of which it was the genotype, thus *Duberria* Fitzinger (1826) was left unused. When proposing *Duberria,* Fitzinger included among its species *Coluber arctiventris* Daudin (1803) = *Coluber duberria* Merrem (1790) = *Coluber lutrix* Linnaeus (1758) which consequently becomes the type by tautonomy of the genus *Duberria. Homalosoma* was proposed by Wagler (1830) merely as a substitute name for *Duberria,* as is shown by his footnote 4 on p. 190.

Bogert (1940, p. 39) remarks that the anterior sixth of the maxilla is devoid of teeth or sockets, and that the maxillary teeth are more widely spaced than is usually the case with snakes. Like Peters (1882a, pl. xvi, fig. 1), he found 10 maxillary teeth, whereas Boulenger (1894a, fig. 19) shows 11 and gives from 10 to 12 in the text.

For various comments on the following *Key*[1], see Loveridge (1942e, pp. 279–280) where the following scale-counts are accepted.

D. variegata	Range of ventrals 97–110, subcaudals 25–36.
D. l. lutrix	Range of ventrals 120–134, subcaudals 25–51.
D. l. shirana	Range of ventrals 126–151, subcaudals 24–46.
D. l. abyssinica	Range of ventrals 118–149, subcaudals 17–39.

Key to the Species

1. Ventrals 97–110; postoculars 2; a loreal; belly reticulated black and white; range: Zululand northwards to Inhambane, Mozambique..... *variegata* (p. 147)

   Ventrals 118–151.....2

2. Postoculars usually 2 (87%, 1 in 13%); a loreal (absent in 7%); belly yellowish in middle; range: highlands and lowlands of Africa south of the Zambesi..... *l. lutrix* (p. 144)

   Postocular usually single.....3

3. Postocular 1 (85%, 2 in 15%); no loreal (100%); belly yellowish in middle rarely dark; range: highlands around Lake Nyasa and southern Tanganyika Territory..... *l. shirana* (p. 142)

   Postocular 1 (100%); a loreal (absent in 10%); belly usually very dark, rarely yellowish in middle; range: highlands of northeastern Tanganyika Territory and western Belgian Congo, north to Uganda and Ethiopia... *l. abyssinica* (p. 139)

Duberria lutrix abyssinica (Boulenger)

1870. *Homalosoma lutrix* (not of Linnaeus) Blanford, p. 458.
1896d. Boulenger, p. 642.
1896. Tornier (part), p. 72 (little use has been made of this reference which contains misprints).
1897. Tornier, p. 65.
1902a. Boulenger, p. 446.
1902b. Mocquard, p. 406.
1909. Peracca, p. 172.
1910a. Sternfeld (part), p. 22 (part text, not fig.).
1912b. Boulenger, p. 332.
1912b. Sternfeld, p. 385.
1912c. Sternfeld, p. 271.

[1] Based on 56 *lutrix*, 50 *shirana*, and 53 *abyssinica* counts.

1915a. Boulenger (part), p. 208.
1915c. Boulenger (part), p. 625.
1915d. Boulenger (part), p. 650.
1918a. Loveridge, p. 332.
1923e. Loveridge, p. 880.
1924b. Loveridge, p. 5.
1925a. Angel, p. 33.
1929h. Loveridge, p. 28.
1930b. Barbour & Loveridge, p. 787.
1933. Schouteden, p. 236.
1933j. Witte, p. 123.
1933m. Witte, p. 91.
1934a. Schwetz, p. 381 (*latrix*, misprint).
1894a. *Homalosoma abyssinicum* Boulenger, Cat. Snakes Brit. Mus., **2**, p. 276, pl. xiii, fig. 2: Lake Ashangi, Ethiopia.
1908c. Sternfeld, pp. 240, 243.
1910a. Sternfeld, p. 22.
1912c. *Homalosoma lutrix* var. *atriventris* Sternfeld, Wiss. Ergebn. Deut. Zentral-Afrika-Exped. 1907–1908, **4**, p. 271: Kissenje = Kisenyi, Belgian Ruanda.
1933h. *Duberria lutrix shiranum* Loveridge (not Boulenger), p. 241.
1936h. Loveridge, p. 34.
1936. Pitman, p. 61, pl. vii, fig. 5, pl. H, fig. 1.
1937d. Mertens, p. 7.
1937. Uthmöller, p. 112.
1938a. Pitman, pp. 211, 231.
1938b. Pitman, pp. 116, 309, 329, pls. as above (reprint).
1940. Bogert (part), p. 39 (Fort Portal specimen only).
1940. *Duberria lutrix abyssinicum* Bogert, p. 40.

Names. Abyssinian Slug-eater; *bulifu* (Kiga).

Description. Rostral once and a third to once and three quarters as broad as deep, visible from above; nasal entire, very rarely semidivided; internasals broader than long, much shorter or about as long as the prefrontals; frontal once and a quarter to nearly twice as long as broad, longer than its distance from the end of the snout, as long as, or slightly longer or slightly shorter than, the parietals; once and a quarter to once and two thirds as broad as a supraocular; loreal small, rarely absent; preocular 1; eye moderate, its diameter greater than its distance from the mouth; postocular 1, rarely 2; temporals 1 + 2, rarely 1 + 1; upper labials 6, very rarely 5 or 7, the third and fourth, or very rarely the third only, or third, fourth and fifth, entering the orbit; 3, rarely 4, lower labials in contact with the anterior sublinguals, which are subequal with, or

shorter than, the posterior. Midbody scales in 15 (rarely 16[1]) rows, smooth; ventrals 110–149[2]; anal entire; subcaudals 17–39[2] pairs.

Color. Above, dark olive or olive brown or blackish, usually a fine, more or less continuous, black vertebral line; sides dark, flecked with white. Below, usually deep gray-black, more or less variegated with lighter, throat sometimes yellow, this color rarely continued as a median stripe as far as the anal shield which may be spotted with yellow.

Size. Total length of ♂ (M.C.Z. 48354), 332 (281 + 51) mm. from Mushongero, Lake Mutanda; of ♀ (M.C.Z. 34921), 434 (384 + 50) mm. Lake Bunyoni.

Sexual dimorphism. Subcaudals of females range from 17–27, in males from 27–39. The latter figure, however, is an unsexed record of Sternfeld's, the highest count on an M.C.Z. male being 37.

Breeding. Eight out of thirteen Kigezi females examined between October and November, by Pitman, held from 6 to 12 eggs. Others examined in June and July by the same author were gravid. Four females from Nyakabande, Kigezi, examined on January 27, 1939, by Loveridge held, respectively, 7 eggs (measuring 12 x 9 mm.), 10 eggs (8 x 5 mm.), 11 eggs (14 x 7 mm.) and a fourth with large embryos. At Kabare, Bukoba, January 10, 1923, a female, though small (290 + 38 mm.), held 10 eggs (12 x 8 mm.). At Lulenga, Ruanda, March 1, 1927, a ♀ held at least two embryos, which were uniformly plumbeous above, blue-gray below, measuring ♂ 103 (86 + 17) mm., and ♀ 100 (85 + 15) mm.

Diet. Slugs in four Nyakabande snakes; eggs (*fide* Sternfeld) in stomach of type of *atriventris*.

Parasites. Worms were observed in Kigezi snakes by Pitman.

Temperament. Pitman (1938b, p. 118) writes: "Its general demeanour suggests inoffensiveness. I have caught and handled numerous specimens and very rarely have any attempted to bite. They are as a rule most docile, placid and friendly, and within a few moments of capture even the most frightened has become tame and confiding!" and adds that, though abundant, the Bakiga do not think it is harmless.

Habitat. Upland country (3,000 to 10,000 feet) with short grassy tussocks.

[1] Bogert (1940, p. 39) in a Fort Portal snake.

[2] Pitman's (1938b, p. 117) record of 151 ventrals and 46 subcaudals, rejected pending confirmation as possibly based on a native's counting.

Range. Highlands of Central Lake region northwest through Uganda to Ethiopia, south in highlands of Kenya and northern Tanganyika.

Localities. **Ethiopia:** Gara Mulata; Grau; Lake Ashangi; Webi Mana. **Uganda:** Bufundi; Fort Portal; Harutindo; Hoima to Kampala; Kisolo (Kissoro); Kitagueta; Lake Bunyonyi; Lake Chahafi; Mityana; Muko; Mushongero; Niwashenya, s.of Kishasha Valley; Nyakabande. **Kenya Colony:** ? Aberdare Mountains; Kinangop Plateau; Meru; Nairobi; Nyeri (Ndjiri). **Tanganyika Territory:** Amani; Arusha; Bukoba; Gomberi; Kabare, Bukoba; Kilema, Kilimanjaro Mountain; Kilimanjaro to Teita; Marungu; Moshi; Ngorongoro. **Belgian Ruanda:** Katana, Lake Kivu; Kisenyi; Lulenga; Volcano region. **Belgian Congo:** Boundary Mountains N. W. of Lake Tanganyika; Ngoma; Rutshuru; Stanleyville (*fide* Schwetz).

Duberria lutrix shirana (Boulenger)

1893. *Homalosoma lutrix* Günther (not Linnaeus), 1892, p. 555.
1898. Johnston, p. 361a.
1894a. *Homalosoma shiranum* Boulenger, Cat. Snakes Brit. Mus., 2, p. 276, pl. xiii, fig. 1: Shire Highlands, Nyasaland.
1896a. Bocage, p. 103.
1933h. *Duberria lutrix shiranum* Loveridge, p. 241 (but range wrong).
1934. Pitman, p. 295 (lists only).
1940. Bogert (part), p. 39 (exclude Portal specimen).

Further citations of '*shiranum*' will be found under *D. l. abyssinica.*

Names. Shire Slug-eater; *nyaluhereka* (Kinga); *isakani* (Nyakusa). But both Wakinga and Banyakusa consider this small snake to be the young of *Trimerorhinus t. tritaeniatus.*

Description. Rostral once and a half to twice as broad as deep; visible from above; nasal entire; internasals broader than long, shorter or longer or about as long as the prefrontals; frontal once and a quarter to once and a half as long as broad, longer than its distance from the end of the snout, as long as, or shorter than, the parietals; once and a half to twice as broad as a supraocular; loreal absent, very rarely present; preocular 1; eye moderate, its diameter greater than its distance from the mouth; postocular 1, rarely 2; temporals 1 + 2, rarely 1 + 1; upper labials 6, very rarely

7, the third and fourth, or very rarely the second, third and fourth, or third, fourth and fifth, entering the orbit; 3, rarely 2, lower labials in contact with the anterior sublinguals, which are subequal with, or shorter or longer than, the posterior. Midbody scales in 15 rows, smooth; ventrals 122–151; anal entire; subcaudals 24–47, pairs.

Color. Above, dark olive, olive brown, red brown or black, usually a fine, more or less continuous, black vertebral line. Below, sometimes deep gray black more or less variegated with lighter, sometimes the dorsal coloration extending on to the ventrals but leaving a median stripe of pale yellow or white down the centre.

Size. Total length of ♂ (M.C.Z. 30184), 379 (300 + 79) mm. from Mangoto, Ubena Mtns.; of ♀ (M.C.Z. 30174), 412 (362 + 50) mm. from Kigogo, Uzungwe Mtns.

Sexual dimorphism. Subcaudals in females range from 25–38, in males from 40–47. Length of tail included in total length from 4.2 to 5.1 times in males, from 6 to 9 times in females.

Breeding. From Rungwe Mountains, Bogert records females holding from 6 to 17 eggs, measuring from 8 x 7 to 13 x 6 mm. He does not observe much correlation between size of snake and the number of eggs produced; it seemed to me that the number increases with the size of the snake though doubtless waning with declining fertility in old individuals. Condensed, my records read: At Kigogo Uzungwe Mtns., January 23 & 30, 1930, seven females held 8 to 13 eggs, measuring from 9 x 6 to 12 x 8 mm., all the larger being on the later date. At Madehani, Ukinga Mtns., February 14, 1930, five females held from 7 to 12 eggs, one batch measured, being 10 x 6 mm. At Mangoto, Ubena Mtns., February 10, 1930, an evidently recently born young male measured 118 (93 + 25) mm.

Diet. Almost exclusively slugs, which are taken by even very young snakes. The only other food found, together with a slug, was a 125 mm. *D. l. shirana* in the stomach of a larger Madehani snake of the same species.

Parasites. Nematode worms in stomachs and intestines of Dabaga and Kigogo snakes.

Enemies. Cannibalistic as related above, though it is possible that the young snake was engaged in swallowing the slug and that this was the incentive for the larger snake to attack so that the engulfing of the young snake was only incidental!

Habitat. They like to bask on the grassy tussocks where their olivaceous color renders them inconspicuous, such tussocks occurred

on hillsides where hoeing by natives resulted in uncovering a good many, for on being disturbed these snakes seek refuge in the loose soil at the base of the tussocks. Others were found in rich, but short, grass in the marshlands of highland valleys.

In habitat then, as well as in diet, size, and a somewhat similar appearance, *D. l. shirana* fills a niche in the East African fauna similar to that occupied by *Storeria d. dekayi* in eastern North America.

Near Kigogo a settler, whose native employees were clearing land for planting coffee, informed me that "blind snakes" were very abundant, and that in digging a furrow forty feet in length they had destroyed over ninety of them! As I found no *Typhlops* in the Uzungwe Mountains I concluded that he referred to *Duberria*. In view of the great economic value of these snakes in a coffee plantation by reason of their diet of slugs they deserve protection by all intelligent settlers: the same applies to *Typhlops* which subsists almost entirely on termites with an occasional caterpillar or slug.

Localities. **Tanganyika Territory:** Dabaga; Ihanganya; Ilolo; Kigogo; Mangoto; Madehani; Rungwe Mountain; Tandala; Ugano. (All these localities being in the Matengo, Ubena, Ukinga, Uzungwe or Rungwe highlands). **Nyasaland:** Shire highlands.

Range. Highlands of southern Tanganyika Territory and Nyasaland.

Duberria lutrix lutrix (Linnaeus)

1735. *Hydra zeylanica* Seba, Rerum Nat. Thesauri, **2**, p. 2, pl. i, fig. 6: "Ceylon".
1735. *Serpens eximia* Seba, Rerum Nat. Thesauri, **2**, p. 92, pl. lxxxvi, fig. 5: Africa.
1758. *Coluber lutrix* Linnaeus, Syst. Nat. ed. 10, **1**, p. 216: "Indiis."
1766. Linnaeus, **1**, p. 375 (275 misprint).
1788. Gmelin, **1**, p. 1086.
1790. *Coluber Duberria* Merrem, Beytr. Naturg., p. 7, pl. i: No locality (after Seba).
1801. *Elaps Duberria* Schneider, **2**, p. 297.
1802. *Coluber tetragonus* Latreille, Hist. Nat. Rept., **4**, p. 97: "? France."
1803c. Daudin, p. 207.
1803c. *Coluber arctiventris* Daudin, Hist. Nat. Rept., **7**, p. 221: n.n. for *duberria* Merrem.
1820. Kuhl, p. 82.
1804. *Coluber erathon* Hermann, Observat. Zool., p. 273: "India orientali."
1826. *Duberria arctiventris* Fitzinger, p. 55.
1830. *Homalosoma arctiventris* Wagler, p. 191.

1849. Smith, A., App., p. 16.
1837. *Calamaria arctiventris* Schlegel, **2**, p. 36, pl. i, figs. 24–26.
1854. *Homalosoma lutrix* Duméril & Bibron, **7**, p. 110.
1858. Günther, p. 20.
1862. Jan, **2**, p. 33.
1865. Jan, livr. 13, pl. iii, fig. 3.
1867a. Steindachner, p. 59.
1884a. Rochebrune, p. 152 (this is erroneous).
1885a. Müller, p. 142.
1887b. Boettger, p. 156.
1887h. Boulenger, p. 175.
1891a. Matschie, p. 609.
1894a. Boulenger, p. 274.
1896. Tornier (part), p. 72 (Cape material).
1898. Boettger, p. 77.
1898. Jeude, p. 35.
1898. Werner, 1896–7, p. 143.
1902. Lampe & Lindholm, p. 29.
1907a. Roux, p. 77.
1907c. Roux, p. 735.
1908b. Boulenger, p. 229.
1908. Gough, p. 25.
1909b. Chubb, p. 35.
1910b. Boulenger, p. 509.
1910a. Hewitt, p. 57.
1910a. Sternfeld (part), p. 22, fig. 25.
1910b. Sternfeld (part), p. 21, fig. 22.
1912. FitzSimons, F. W., p. 90.
1913. Hewitt & Power, p. 162.
1916. Andersson, p. 40.
1922c. Angel, p. 357.
1929. Rose, p. 152, fig. 97.
1929a. Werner (part), p. 150, fig. 44.
1935. Power, p. 334.
1868. *Cyclophis catenatus* Theobald, Cat. Rept. Asiatic Soc. Mus., p. 49: "Simla, India."
1908. *Homalosoma shiranum* Gough (not of Boulenger), p. 25.
1933h. *Duberria lutrix lutrix* Loveridge, p. 242.
1939b. FitzSimons, V., p. 21.
1940. Bogert, p. 39.
1937e. *Duberria lutrix* Hewitt, p. 52.

Names. Russet Slug-eater (English); *rooislang* (Dutch).

Description. Rostral once and a third to nearly twice as broad as deep, visible from above; nasal entire; internasals broader than long,

about as long as the prefrontals; frontal once and a half to twice as long as broad, longer than its distance from the end of the snout, as long as, or slightly longer or slightly shorter than, the parietals, once and a half to twice as broad as a supraocular; loreal small, rarely transversely divided or absent; preocular 1, very rarely 2; eye moderate, its diameter greater than its distance from the mouth; postoculars 2, lower sometimes minute, or 1 only; temporals 1 + 2, rarely 1 + 1 or 1 + 2; upper labials 6, the third and fourth entering the orbit; 3, rarely 4, lower labials in contact with the anterior sublinguals, which are subequal with, or longer than, the posterior. Midbody scales in 15 rows, smooth; ventrals 120–144; anal entire, very rarely divided[1]; subcaudals 24–51, pairs. (21–46 *fide* Boulenger).

Color. Above, brick red, reddish brown, pale brown, olive or yellowish, with or without a vertebral series of fine dark dashes; flanks gray or plumbeous, usually sharply distinct from dorsal coloring. Below, white, cream or yellowish, the outer edges of the ventrals gray, usually flecked or spotted with black.

Size. Total length of ♂ (M.C.Z. 42639), 364 (297 + 67) mm., from Port St. John; of ♀ (M.C.Z. 11921), 377 (322 + 55) mm., from Cape Town. Both surpassed by Boulenger's unsexed (?♂) record of 390 (325 + 65) mm.

Sexual dimorphism. In Museum of Comparative Zoölogy material the subcaudals of females range from 25–32[2], in males from 33–49.

Breeding. Viviparous, producing from 3 to 10 young in February (F. W. FitzSimons).

Diet. Mainly slugs (Rose), also snails, insects and their larvae (Hewitt).

Enemies. Two in gullet of Secretary Bird (*Sagittarius serpentarius*) (Anderson).

Defense. When alarmed, curls up like a roll of tobacco (Hewitt).

Habits. Slow-moving and, though not a burrower, highly secretive, being found in loose soil about the base of bushes, beneath fallen leaves and pine needles, and in dry grass (Smith, Rose, Hewitt).

Habitat. Common alike in the coastal districts of Cape Province and the high plateaux of the interior (Hewitt).

Localities. **Mozambique:** Rikatla. **Southern Rhodesia:** Bulawayo; Chirinda Forest. **Transvaal:** Barberton; Belfast; Haenertsburg; Irene; Johannesburg; Lydenburg; Mariepskop; Mphome;

[1] In Chirinda Forest specimen (Transvaal Mus. 16185), *fide* FitzSimons (1939b, p. 21).

[2] The alleged ♀ with 48 recorded by Bogert (1940, p. 39), proved on re-examination to have been a ♂, *fide* Bogert (letter of 17, VI, 40).

Potchefstroom; Pretoria; Sabi; Woodbush. **Zululand:** Melmoth· **Natal:** Durban; Hilton Road, Merebank. **Orange River Colony** (*fide* F. W. FitzSimons).**Cape Province:** Albany; Burghersdorp; Caledon; Cape Town; Ceres; Grahamstown; East London; Fransche Kraal; Kalk Bay; Knysna; Little Namaqualand; Malmsbury; Middleburg; Paarl; Port Alfred; Port Elizabeth; Port St. John; Sir Lowry's Pass; Stellenbosch; Table Mountain; Tokai.

Range. Africa south of the Zambesi exclusive of South West Africa and Angola.

Duberria variegata (Peters)

1854. *Homalosoma variegatum* Peters, Monatsb. Akad. Wiss. Berlin, p. 622. Inhambane, Mozambique.
1855. Peters, p. 51.
1882a. Peters, p. 107, pl. xvi, fig. 1.
1888d. Boulenger, p. 140.
1894a. Boulenger, p. 276.
1896a. Bocage, p. 93.
1898. Sclater, p. 99.
1908b. Boulenger, p. 229.
1910b. Boulenger, p. 509.
1912. FitzSimons, F. W., p. 90.
1929a. Werner, p. 151.

Description. Rostral broader than deep, visible from above; nasal entire; internasals slightly longer than the prefrontals; frontal once and a half as long as broad, longer than its distance from the end of the snout, as long as the parietals; nearly twice as broad as a supraocular; loreal small; preocular 1; eye rather larger than in *lutrix*, its diameter greater than its distance from the mouth; postoculars 2; temporals 1 + 2; upper labials 6 or 7, the third and fourth or fourth and fifth entering the orbit; 3 lower labials in contact with the anterior sublinguals. Midbody scales in 15 rows, smooth; ventrals 97–110; anal entire; subcaudals 25–36, pairs.

Color. Above, dark or olive brown with three series of dark brown spots or irregular lichen-like brownish-white variegation. Below, reticulated black and white.

Size. Total length 250 (217 + 33) mm.

Sexual dimorphism. Subcaudals in a female were 25, in a male 36.

Remarks. In the absence of material, the foregoing is adapted from Boulenger (1894a, p. 276).

Localities. **Mozambique:** Delagoa Bay; Inhambane; Lorenzo Marques. **Zululand:** Mseleni.

Range. Mozambique to Zululand. (Senegambia in error by Rochebrune, 1884a, p. 152).

Genus Thelotornis

1849. *Thelotornis* A. Smith, Ill. Zool. S. Africa, **3**, App. p. 19 (type *capensis* Smith.)

1859. *Cladophis* A. Duméril, Arch. Mus. Hist. Nat. Paris, **10**, p. 204 (type *Leptophis kirtlandii* Hallowell).

For further partial synonymy see Boulenger (1896d, p. 184).

Maxillary teeth 11–17, gradually increasing in size, followed after an interspace by 2–3 enlarged grooved fangs situated below the posterior border of the eye; anterior mandibular teeth strongly enlarged. Head distinct from neck, with strong canthus rostralis; eye large with horizontal pupil; nasal entire; 2, rarely 1 or 3, loreals; preocular. Body cylindrical; scales oblique, narrow, slightly keeled, with apical pits, in 19 rows, of which the vertebral is not enlarged; ventrals rounded. Tail long, subcaudals in two rows.

Range. Africa south of 15° N., i.e. Portuguese Guinea and northern South West Africa, east to Italian Somaliland and Natal.

Remarks. Boulenger (1896d, p. 185), from whom the above description is largely taken, with increase in range of maxillary teeth from Bogert (1940, pp. 69, 71), remarks that the ectopterygoid bone is forked, the two branches articulating with the maxillary; an arrangement which he states is unique among ophidia. Bogert describes the hemipenes for both races.

Schmidt (1923, p. 113) points out that: "The depressed and flat head, with the canthus rostralis distinctly projecting, forming a shallow loreal groove, is very characteristic, distinguishing the species at once from all other African snakes." In the field one is most likely to mistake it for the slender, vine-like, bush-climbing *Psammophis biseriatus*, and I have confused it with the more blunt-headed young of its near relative, *Dispholidus typus*, the latter being vinaceous colored with white labials.

Key to the Races

Rostral and anterior ends of nasals broadly visible from above; crown of head immaculate, labials more or less immaculate, neck crossbanded; range: Portu-

guese Guinea to northern Angola, east to southern Somaliland and[1] central Tanganyika Territory ..... *k. kirtlandii* (p. 149)

Rostral and anterior ends of nasals narrowly visible from above; crown of head speckled with black, labials heavily speckled with black, neck not crossbanded though black lateral blotches usually present; range: central Angola and[1] northern South West Africa, east to central Tanganyika Territory and Natal. *k. capensis* (p. 154)

Thelotornis kirtlandii kirtlandii (Hallowell)

1844. *Leptophis Kirtlandii* Hallowell, Proc. Acad. Nat. Sci. Philadelphia, p. 62: Liberia.
1854a. *Oxybelis Lecomtei* Duméril & Bibron, Erpét. Gén., **7**, p. 821: Gaboon.
1854a. *Tragops rufulus* Duméril & Bibron, Erpét. Gén. ,**7**, p. 827: Senegal.
1854a. *Dryophis Kirtlandi* Hallowell, p. 100.
1858c. [2]Günther, p. 156.
1863a. Günther, p. 22.
1866a. Bocage, p. 48.
1869. Jan, livr. 32, pl. vi. fig. 2.
1885d. Müller, p. 684.
1886. Martinez y Saez, p. 339.
1888a. Boettger, p. 65.
1889. Hesse, p. 267.
1889. Mocquard, p. 145.
1893. Prato, p. 13.
1895a. Bocage, p. 119.
1895c. Bocage, p. 13.
1903a. Bocage, p. 44.
1856b. *Oxybelis violacea* Fischer, Abhand. Nat. Ver. Hamburg, **3**, p 91, pl. ii, fig. 7: Edina, Grand Bassa County, Liberia.
1857. *Oxybelis Kirtlandii* Hallowell, p. 59.
1859. *Cladophis Kirtlandii* Duméril, p. 204, pl. xii, fig. 8.
1874. Reichenow, p. 292.
1867b. *Thelotornis kirtlandii* Peters, p. 235.
1875a. Peters, p. 199.
1884a. Fischer, p. 11.
1884a. Rochebrune, p. 178 (ignored).
1890. Büttikofer, p. 478.
1892. Matschie, p. 110.

[1] It should be borne in mind that Angola and Tanganyika are areas of intermediates and that an occasional lowland specimen in the Voi region of southeast Kenya may preponderate in *capensis* attributes.

[2] This, and some of the following, were spelt *Dryiophis*.

1893c. Matschie, p. 212.
1893. Prato, p. 13.
1893b. Stejneger, p. 733.
1896d. Boulenger (part), p. 185.
1896. Tornier (part), p. 83.
1897b. Boulenger, p. 279.
1897g. Boulenger, p. 279.
1897. Sjöstedt, p. 35.
1897. Tornier, p. 65.
1898. Boettger, p. 107.
1898a. Werner, p. 209.
1899a. Werner, p. 140.
1900b. Boulenger, p. 454.
1900. Ferreira, p. 52.
1901b. Tornier, p. 64.
1902a. Boulenger, p. 447.
1902a. Werner, p. 345.
1905f. Boulenger, p. 185.
1906i. Boulenger, p. 214.
1906. Johnston, p. 832.
1907. Lönnberg, p. 16.
1908a. Sternfeld, pp. 413, 428.
1908b. Sternfeld, pp. 219, 233.
1909a. Sternfeld, p. 21, fig. 33.
1909b. Sternfeld, p. 21, fig. 28.
1910. Müller, p. 607.
1910a. Sternfeld (part), p. 31, fig. 34.
1911. Lampe, p. 201.
1911b. Nieden, p. 442.
1911a. Sternfeld, p. 251.
1912. Hobley, p. 52.
1913. Lönnberg & Andersson, p. 4.
1913a. Werner, in Brehm, p. 403, pl. viii, fig. 3.
1915a. Boulenger (part), p. 213.
1915c. Boulenger (part), p. 631.
1915d. Boulenger (part), p. 654.
1916a. Loveridge, p. 86.
1918a. Loveridge, p. 327.
1919b. Boulenger (part), p. 290.
1919g. Boulenger, p. 26.
1921a. Chabanaud, p. 471.
1921b. Chabanaud, p. 525.
1921b. Noble, p. 168, fig.
1922. Aylmer, pp. 15, 21.
1923e. Loveridge (part), p. 887.

1923. Schmidt, p. 112, pl. xiv.
1924b. Loveridge (part), p. 7.
1925. Werner, 1924, p. 131, fig. 5.
1927. Calabresi, p. 56.
1927c. Power, p. 410.
1927d. Witte, p. 325.
1928c. Barbour & Loveridge, p. 128.
1928g. Loveridge (part), p. 34.
1929h. Loveridge, p. 33.
1930a. Barbour & Loveridge, p. 773.
1933f. Angel (part), p. 165, figs, 62, 62a.
1933m. Witte, p. 94.
1934a. Schwetz, p. 382.
1934c. Scortecci, p. 70, fig. 30.
1936h. Loveridge (part), p. 39.
1936j. Loveridge, p. 265.
1936c. Parker, p. 125.
1937c. Loveridge, p. 277.
1937f. Loveridge, pp. 493, 496, 503.
1937. Pitman (part), p. 242, pl. xi, fig. 5.
1937. Uthmöller, p. 120.
1938a. Pitman, pp. 216, 233.
1938. Uthmöller, p. 45.
1939a. Scortecci, p. 283.
1939c. Scortecci (part), p. 159, figs. 88–89.
1940. Bogert, p. 69, fig. 10.
1942b. *Thelotornis kirtlandii capensis* Bogert (intermediates), p. 2.
1942e. *Thelotornis kirtlandii kirtlandii* Loveridge, p. 292.

Further citations of *'kirtlandii'* will be found under *k. capensis.*

Names. Western Bird Snake or Vine Snake (English); *bokarrabai* (Temne: Sierra Leone: Aylmer); *mbeya* (Wamba: Uganda: Loveridge); *mraringa* (Teita: Kenya: Loveridge); *lukukuru* (Kami: Tanganyika: Loveridge); *kawaikukoto* (Cazengo region, Angola: Ferreira).

Description. Rostral about once and three-quarters to twice as broad as deep, strongly recurved on snout so broadly visible from above; nasal entire, its anterior end reaching upper surface of snout; internasals about as broad as long, as long as or shorter than the prefrontals; frontal semi-bell-shaped, twice to thrice as long as broad (in the middle), as broad as, or narrower or broader than, a supraocular, as long as, or slightly shorter or longer than, its distance from the end of the snout, as long as, or slightly shorter than, the parietals; loreals 2, sometimes 1 or 3 (or absent *fide* Hallowell); preocular 1; eye very large,

its diameter much greater than its distance from the mouth; postoculars 3, rarely 2, the lowest in contact with 2 upper labials; temporals 1 + 2, very rarely 2 + 2; occipitals 2, separated by 1, 2, or 3 smaller shields; upper labials 8, rarely 7 or 9, the fourth and fifth, or third, fourth and fifth, or fifth and sixth, entering the orbit; 4, rarely 3 or 5, lower labials in contact with the anterior sublinguals, which are usually much shorter than, though sometimes as long as, the posterior. Mid-body scales in 19[1] rows which are narrow, very oblique, and feebly keeled; ventrals 153–189; anal divided; subcaudals 137–175 pairs.

Color. Above, head green, uniform, lips cream-colored or pink, uniform (in west) or slightly flecked with black (in east); dorsum pinkish brown speckled and striated with brown, anteriorly heavily crossbarred with black. Below, vinaceous, gray or white, speckled or striated with brown. Iris golden (Reichenow). Tongue bright red with a black tip (A.L.)

Size. Total length of ♂, 1422 (821 + 601) mm., from Mount Mbololo, Kenya Colony; total length of ♀, 1478 (919 + 559) mm. from Morogoro, Tanganyika Territory.

Remarks. Dr. Dunn (7. x. 1940) tells me that the type of *kirtlandii* cannot be located in the Academy of Natural Sciences of Philadelphia. Only in recent times has the Southeastern Bird Snake been definitely accepted as a recognizable geographical race. In this account an attempt has been made to carefully allocate all available data to its correct subspecies.

Dentition. The number of teeth anterior to the three enlarged fangs vary from 11 to 14 according to Bogert (1940, p. 70) whom see for further discussion.

Anatomy. For a full description of the hemipenes of four Congo snakes, in which they extended to the sixth subcaudal only, see Bogert (1940, p. 70).

Breeding. On October 4, a Nyange ♀ held 5 eggs, each measuring 15 x 15 mm. On January 16, a Morogoro ♀ laid 8 eggs, each measuring 27 x 15 mm.

Diet. Actually birds seem less frequently an article of diet than arboreal lizards or snakes. A green snake (*Chlorophis carinatus*) has been found in a Lukolela specimen (Bogert); while at Nyange, a captive Bird Snake ate a *Chlorophis neglectus, Neusterophis o. ulugurensis* and *Crotaphopeltis h. tornieri*, and apparently the same fate befell an Egg-eater (*Dasypeltis s. medici*) that shared the cage. At

[1] My (1929b, p. 33) count of 15 is erroneous, as also Hallowell's (1854, p. 10) of 13, and Uthmoller's (1934, p. 120) of 17. Their oblique nature often makes an accurate count difficult.

Bundibugyo an *Agama atricollis* was recovered from a Bird Snake, while a Buta specimen was found to have swallowed a skink (*Mabuya m. maculilabris*) and two large nestlings of a weaver (*Spermophaga*).

When the Bird Snake seized the large Tornier's Snake it held on doggedly, occasionally chewing with its poison fangs. The Tornier's Snake felt about with its tail for twigs or branches on which to get a purchase. After eight minutes spent in this way the Bird Snake tried to swallow and was then observed to be in difficulties; the Tornier's Snake had hooked its teeth into the mucous membrane of the Bird Snake's mouth. I intervened and separated them whereupon the Tornier's Snake tried to make off, but the Bird Snake — which had itself withdrawn — returned swiftly, seized its victim, and began to swallow again. The Tornier's Snake, being a large one as I have said, resulted in an unusually laboured deglutition. In all it took an hour from the moment when the Tornier's Snake was first seized until the last of it disappeared.

Parasites. Nematode in a Lukolela snake (Bogert), and fragment of a cestode in one from Nyange (Loveridge).

Defence. The first line of defence of this remarkably vine-like reptile is cryptic. Partly lying along a branch about which its tail is entwined, the Bird Snake projects its anterior third far into space and so remains rigidly motionless except, perhaps, for an occasional flicker of its black-tipped, scarlet tongue. The bright green top of its somewhat leaf-shaped head assists in the illusion, for the Bird Snake furnishes one of the finest examples of cryptic coloring to be found among African snakes.

When molested, however, prior to lunging, the snake assumes a most threatening attitude, being able, like the Boomslang, to vertically inflate its anterior third to a surprising extent. This is made possible by the cartilaginous rings, which support the trachea, being incomplete dorsally. The result of this inflation is to accentuate the brighter coloring of the distended neck, particularly the broad black crossbands. Müller (1910, p. 608), who has given an excellent account of this behavior, states that the excited snake also extends its strangely colored tongue to the fullest extent, the shiny black tips closely applied together, or spread so widely apart as to form an angle of 180°.

Habitat. Though essentially an arboreal species, it seems reasonable to suppose that even the western form descends to the ground at times in search of prey.

Localities. **Portuguese Guinea. French Guinea:** Beyla. **Sierra Leone. Liberia:** Edina; Gbanga. **Gold Coast:** Adjah

Bippo; Ashanti; Fantee. **Togoland:** Misahöhe. **Nigeria:** Ifo, Ondo Province; Oil River. **British Cameroon:** Johann Albrechtshöhe; Victoria. **French Cameroon:** Bipindi; Bitye; Dibongo near Edea; Ja River; Jossplatte; Kribi; Longji. **Spanish Guinea:** Benito River; Corisco; Elobey district. **Fernando Po:** Bahia de S. Carlos. **French Congo:** Gaboon; Loango Mouth; Loudinia-Niari. **Belgian Congo**[1]**:** Akenge; Avakubi; Banana; Basongo; Buta; Dika; Elisabethville; Epulu Ferry; Ganda Sundi in Mayumbe; Kanzenze; Kasai Kunungu; Lukolela; Mayon; Mayumbe; Niangara; Niapu; Nyampoko; Poko; Povo Nemlao; Pove Netonna; Saidi's Village; Stanleyville; Vube. **Angola**[2]**:** Cazengo; Duque de Braganca; Quirimbo (For southern localities see *T. k. capensis*). **Uganda:** Budongo Forest; Bundibugyo; Entebbe; Fort Portal; Jinja; Lutoto Hill in w. Ankole. **Italian Somaliland:** Belet Amin; Kismayu; Mofi. **Kenya Colony:** Jilore; Kilibassi;[3] Mt. Mbololo; Sokoki Forest; Tana River; Taveta; Teita Mtns.; Voi[3]. **Tanganyika Territory:**[2] Arusha; Dunda on Kingani River; Kilimanjaro Mtns. Gomberi and Kibonoto; Marangu; Morogoro; Tumbanatji; Uleia; Uluguru Mtns. Nyange and Vituri; Usambara Mtns. Amani, Derema, and Mlalo near Ambangula.

Range. Tropical Africa from Portuguese Guinea to northern Angola, east through Uganda and Kenya to Italian Somaliland and south to central Tanganyika Territory.

Thelotornis kirtlandii capensis Smith

1849. *Thelotornis capensis* A. Smith, Ill. Zool. S. Africa, **3**, App., p. 19: Kaffirland and the country towards Port Natal.
1940. Bogert, p. 70, fig. 11.
1854. *Oxybelis Lecomtei* Peters (not Duméril & Bibron), p. 623.
1855. Peters, p. 52.
1881b. *Dryiophis Oatesii* Günther, in Oates, Matabeleland & Victoria Falls App., p. 330, pl. D.
1889a. Günther, p. 337, pl. D. (*Dryophis*).
1894a. Günther, p. 618.
1898. Johnston, p. 361a.

[1] Some of these in the southern Congo may be referable to the race *capensis*.

[2] For further localities see those listed under the race *capensis*.

[3] Though characters of the Voi and Kilibassi specimens are preponderatingly *capensis*, crown of head is immaculate.

1882a. *Thelotornis Kirtlandii* Peters (not Hallowell), p. 131, pl. xix, fig. 2.
1890b. Boulenger, p. 93.
1891a. Boulenger, p. 307.
1896d. Boulenger (part), p. 185.
1896. Tornier (part), p. 83.
1897e. Boulenger, p. 801.
1897. Tornier (part), p. 65.
1898. Johnston, p. 361a.
1898. Sclater, p. 100.
1898. Werner, 1896–7, p. 146.
1899a. Mocquard, p. 219.
1907a. Boulenger, p. 11.
1907j. Boulenger, p. 487.
1908b. Boulenger, p. 229.
1908. Chubb, p. 221.
1908. Gough, p. 32.
1908b. Mocquard, p. 558.
1908c. Sternfeld, p. 246.
1909a. Chubb, p. 596.
1909b. Chubb, p. 36.
1910b. Boulenger, p. 515.
1910. Peracca, p. 4.
1910a. Sternfeld (part), p. 31.
1910b. Sternfeld, p. 29, fig. 33.
1910c. Sternfeld, p. 56.
1912. FitzSimons, F. W., p. 126.
1912. Peracca, p. 6.
1913. Hewitt & Power, p. 164.
1915a. Boulenger (part), p. 213.
1915c. Boulenger (part), p. 631.
1915d. Boulenger (part), p. 654.
1915. Breijer, p. 113.
1915c. Werner, p. 363.
1919b. Boulenger (part), p. 290.
1921a. Angel, p. 42.
1923e. Loveridge (part), p. 887
1924b. Loveridge (part), p. 7.
1928. Cott, p. 953.
1928d. Loveridge, p. 56.
1928g. Loveridge (part), p. 34.
1931. Monard, p. 106.
1931. Power, p. 48.
1933f. Angel (part), p. 165.
1933h. Loveridge, p. 257.
1934. Pitman, p. 297.

1935. Cott, p. 969.
1935. Cunha, p. 11.
1936h. Loveridge (part), p. 39.
1937a. FitzSimons, V., p. 274.
1937b. Monard (part), pp. 128, 135.
1937a. Parker, p. 630.
1937. Pitman (part), p. 242, col. pl. L, fig. 3.
1939b. FitzSimons, V., p. 23.
1939c. Scortecci (part), p. 159.
1941. Moreau & Pakenham, p. 108.
1887h. *Dryophis kirtlandii* Boulenger (not Hallowell), p. 177.
1893. Pfeffer, p. 86.
1895. Jeude, p. 229.
1895a. *Dryiophis Kirtlandii* var. *mossambicana* Bocage, Herp. Angola Congo, p. 119: Manica, Mozambique (restricted).
1913. *Thelotornis kirtlandi* var. *capensis* Boettger, p. 345.
1927. *Theborius Kirtlandii* (sic) Wyllie, p. 129.
1937b. *Thelotornis kirtlandii capensis* Mertens, p. 14.
1942e. Loveridge, p. 294.

Further citation of '*capensis*' will be found under *k. kirtlandii*.

Names. Southeastern Bird Snake or Vine Snake (English); *nondo* (Rungu: Tanganyika); *lukungu* (Nyika: Tanganyika); *nalakutu* (Yao at Dodoma); *lukukuti* (Yao at Kitaya, Tanganyika); *lukukutu* (Konde: Tanganyika); *likukutu* (Mawiha: Tanganyika: all Loveridge); *injarucucutue* (Sena: Mozambique: Peters); *nharicucuto* (Sena: Mozambique: Cott); *cucuta* (Quando, Angola: Anchieta); *nhocamenha* (Bibala, Angola: Bocage); *kalakukwiti* (N. Rhodesia: Neave); *ukotikoti* (Matabele: S. Rhodesia: Chubb); *vogelvreter slang* (Dutch: F. W. FitzSimons).

Description. Rostral about once and a quarter to twice as broad as deep, strongly recurved on snout so moderately or narrowly visible from above; nasal entire, its anterior end not, or but scarcely, reaching upper surface of snout; internasals about as broad as long, or longer than broad, as long as, or shorter or longer than, the prefrontals; frontal semi-bell-shaped, twice to twice and a half as long as broad (in the middle), as broad as or narrower than a supraocular, as long as, or slightly shorter or longer than, its distance from the end of the snout, as long as or slightly shorter than, the parietals; loreals 2, sometimes 1; preocular 1; eye very large, its diameter much greater than its distance from the mouth; postoculars 3, rarely 2 or 4, the lowest in contact with 2 upper labials; temporals 1 + 2; occipitals 2, separated by a smaller shield; upper labials 8, the fourth and fifth, or rarely the third and

fourth, entering the orbit; 4, rarely 5, lower labials in contact with the anterior sublinguals, which are usually shorter than the posterior. Midbody scales in 19 rows which are narrow, very oblique, and feebly keeled; ventrals 147–170; anal divided; subcaudals 131–166 pairs.

Color. Above, head of young pink, uniform, of adult green or pinkish brown flecked or speckled with darker, a brownish black-dotted band passing through the eye, an oblique streak below the eye on the upper lip which is cream or pink speckled with dark brown or black; dorsum pinkish brown or gray above, uniform or with blotches and striations and one or more black streaks on the nape. Below, vinaceous or gray speckled and striated with brown.

Size. Total length of ♂, 1453 (875 + 578) mm. from Nchingidi, Tanganyika Territory; total length of ♀, 1348+ (933 + 415+) mm. from Zengeragusu, Tanganyika Territory; both, however, exceeded by an unsexed specimen of 1470+ (935 + 535+) mm. from Caconda, Angola.

Remarks. The type of *capensis* cannot now be located (V. Fitz-Simons, 1937a).

Dentition. The number of teeth anterior to the three enlarged fangs vary from 11 (Hanha) to 16 (Rungwe) according to Bogert (1940, p. 71) whom see for further discussion.

Anatomy. For a full description of the hemipenes of two Hanha and Mlanje snakes, in which they extended to the ninth subcaudal, see Bogert (1940, p. 71) who also comments on the binocular vision attributed to this species by Walls (1932, p. 69).

Breeding. On December 24, at Zengeragusu, a ♀ laid 2 eggs, measuring 38 x 15 and 34 x 14 mm., respectively, which were dry when found; but for her escape the following day she might have laid more.

Diet. Only one snake of many examined, held feathers, apparently those of a weaver or finch. The Zengeragusu snake, confined with a *Typhlops s. excentricus*, allegedly swallowed the latter, according to the native in charge of them. Some weeks after her escape she was located in a tree only two hundred yards from the house, in her stomach was a recently swallowed chameleon (*C. d. dilepis*). Bogert (1940, p. 71) records finding a chameleon (*Brookesia platyceps*) in each of two Rungwe snakes, and two small terrestrial toads in a snake from Hanha. At Nchingidi two snakes each held a toad (*Breviceps mossambicus*).

Parasites. Cestode in a Northern Rhodesian snake (Pitman).

Defence. See account under typical form, and also that of Cott (1935, p. 969) with special reference to its cryptic coloration.

Migration. Mr. E. Wyllie, a surveyor who had spent many years in the veld, states (1927) that: "a number of these snakes" followed two days later by "a second contingent" passed through his camp on the Pongola River, Piet Retief District, travelling in a northwesterly direction. Never before had he witnessed snakes travelling "*en masse.*"

Habitat. Boulenger (1897e) has stated that Bird Snakes occur on the Nyika Plateau between 6,000 and 7,000 feet. Pitman (1937) remarks on its occurrence from 1,500 feet in the Zambezi Valley to 5,000 feet on the plateau. He also invites attention to the frequency with which he has encountered this arboreal reptile upon the ground. As a savanna species in the East and South, from sea level upwards, it is obvious that it must make its way from tree to tree by means of the ground. Bogert (1940, p. 72) discusses at length the alternatives as to whether *Thelotornis* originated in the western rain forest and then spread to the savanna — the most reasonable view it seems to me — or else whether *capensis* represents a stage in the evolution of *kirtlandii.* The assumption of the absence of intergrades, however, is fallacious, being made in the absence of a good series of Tanganyika snakes.

At Kitungulu I obtained a Bird Snake under rather unusual circumstances. In a native clearing stood two huge trees about whose bases were piled quantities of dry grass. As the situation appeared ideal for cobras, I had the heap ignited. The heat from the flames rose into the trees though the flames fell far short; towards the end of the conflagration the Bird Snake dropped from a height of at least twenty feet. Though I saw it fall I mistook it for a branch till a shout from one of my "boys" drew my attentoin to the departing snake which I pursued and captured among the standing maize.

Localities. **Tanganyika Territory**[1]: Kitaya; Kitungulu; Kondoa Irangi; Lake Victoria; Marangu; Mikindani; Mpwapwa; Nchingidi; Rungwe Mtn.; Sanya; Uleia; Zengeragusu. **Mafia Island. Mozambique:** Cabaceira Id.; Cheringoma Farm, Inhaminga; Chifumbazi; Delagoa Bay; Fambani; Inguenha, Maputa; Loangwa Valley; Lumbo; Manica; Massangulo; Ngaza; Querimba Id.; Quilimane; Sena; Tete. **Nyasaland:** Lake Nyasa; Mandala; Mlanje (Milanji); Nyika Plateau; Shire Highlands; Zomba. **Northern Rhodesia:** Barotze; Batoka; Broken Hill to Bwana Mkubwa; Feira district; Loangwa Valley; Mpika; Mumbwa; Mwengwa on Kafue River; Namwala; Petauke; Serenje; Upper

[1] For further localities see those listed under the typical form.

Zambezi. **Southern Rhodesia:** Bulawayo; Chirinda Forest; Eldorado; Empandeni; Gwena's, Gwanayaya River;Irome; Khami; Matabeleland; Zambesi. **Bechuanaland Protectorate:** Lealui; Lobatsi (reported). **Transvaal:** Banolierkop; Comati and Crocodile Rivers junction; Dwar's River, Zoutpansberg district; Legogot; Louw's Creek; Malta near Leysdorp; Mariepskap; Mmoouve, 42 miles N. of Serowe; Piet Retief district; Pretoria; Zoutpansberg. **Zululand:** Hlabisa; Kosi Bay; Mseleni; Somkele; Ubombo. **Natal:** Country towards Port Natal; Durban; Umvoti River. **Cape Province:** Francistown. **South West Africa:** Gobabis; Grootfontein. **Angola**[1]: Bibala; Caconda; Chimporo; Cunene River; Hanha; Kuvangu; Quando River; Quilengues; Querimbo; Quissangue; Vila da Ponte.

Distribution. Africa south of the equator from central Angola and northern South West Africa, east to central Tanganyika Territory and Natal.

Folklore. An Myeye of Tabora voiced the belief that the species was not vicious, but that it would bite if trodden upon and that then the victim would die in a minute (Loveridge, 1928d). Pitman (1937) directs attention to local names in Northern Rhodesia such as: "the little bit of wood which bites," and "he who has been bitten can get as far as to see the roofs of his village but no farther before he dies." Wyllie (1927) was told by natives of the Piet Retief district, Transvaal, that this snake was very dangerous, averring that it licks its victim — ox, goat, or man — instead of striking. This results in the skin peeling off and the exposed tissue becoming septic leads to the demise of the victim.

Genus Calamelaps

1849. *Choristodon* A. Smith (not Jonas), Ill. Zool. S. Africa, **3**, App. p. 18 (type *concolor* Smith).

1866a. *Calamelaps* Günther, Ann. Mag. Nat. Hist. (3), **18**, p. 26 (type *Calamaria unicolor* Reinhardt).

Maxillary very short with 3–4 teeth gradually increasing in size, followed after an interspace by a large grooved fang situated below the eye; anterior mandibular teeth enlarged. Head small, not distinct from neck; eye minute, with round pupil; nasal entire[2] or divided, in

[1] For further localities see those listed under the typical form.

[2] Tornier (1901a) states that in young examples of *C. u. unicolor* the nasal is entire, becoming semidivided or divided with growth. He mentions one individual in which the nasal is entire on one side of the head, divided on the other.

contact with the rostral; no loreal; no preocular. Body cylindrical; scales smooth, without pits, in 17–21[1] rows; ventrals rounded. Tail very short; obtuse, subcaudals in two rows.

Range. Africa from Portuguese Guinea and Angola east to Kenya Colony and Natal.

Remarks. Apparently the rostral develops with age, as in *Prosymna*; it is not distinguishable from that of *Rhinocalamus* and should therefore be avoided as a key character.

Key to the Species

1. Frontal as long as, or shorter than, its distance from the *rostral;* temporals 1 + 1; upper labials 7; fifth lower labial largest; posterior sublinguals as long as, or almost as long as, the anterior; ventrals 133–148; range Natal ..... *concolor* (p. 161)

   Frontal as long as, or longer than, its distance from the end of the *snout;* temporal 1 only; upper labials 6 or 5; fourth lower labial largest; posterior sublinguals often scarcely differentiated, if distinct then much shorter than the anterior; ventrals 161–194; unknown in Natal 2

2. Midbody scales in 21 rows; range Angola and Transvaal north to extreme southwestern Tanganyika Territory (at Tukuyu nr. Lake Nyasa) ..... *u. polylepis* (p. 162)

   Midbody scales in 19 to 15 rows 3

3. Midbody scales in 19 rows; range Zululand, north along coast to Kenya Colony (at Ngatana, Tana River), penetrating inland in Transvaal (to Gravelotte) in Southern Rhodesia; (to Aatosma, and Empandeni where it meets with *polylepis*) and in Northern Rhodesia (to Lake Bangweulu) ..... *w. warreni* (p. 163)

   Midbody scales in 17 to 15 rows 4

4. Midbody scales in 17 rows; range Tanganyika Territory (Uluguru Mtns.) north to Kenya Colony (at Peccatoni, *fide* Boettger) west to Sierra Leone and "Guinea" ..... *u. unicolor* (p. 165)

   Midbody scales in 15 rows; range Portuguese Guinea (Rio Cassine, known only from the type) ..... *u. feae* (p. 168)

Sexual dimorphism. The marked dimorphism in the number of subcaudals in the races of *unicolor* is best shown in tabular form. It is

[1] Said to be 13 in type of *C. concolor* but considered erroneous by FitzSimons (1937a).

important to note, however, that *the sexes have had to be assumed in the case of polylepis* as authors have not furnished the sex, moreover, though Boulenger stated that the type of *feae* was a ♂, from the scale-counts it would appear to be a ♀.

	♂♂.	♀♀.	♂♂.	♀♀
C. u. polylepis	163–194,	197–212 ventrals;	27–27,	16–20 subcaudals
C. u. warreni	161–177,	179–209 ventrals;	26–30,	17–32 subcaudals
C. u. unicolor	164–182,	201–208 ventrals;	28–38,	21–27 subcaudals
C. u. feae	196,	ventrals;	23	subcaudals

Calamelaps concolor (Smith)

1849. *Choristodon concolor* A. Smith, Ill. Zool. S. Africa, **3**, App., p. 18: Kaffirland eastward of Cape Colony, i.e. Natal.
1897h. Boulenger, p. 175.
1896d. *Calamelaps concolor* Boulenger, p. 246.
1898. Sclater, p. 100.
1910b. Boulenger, p. 516.
1912. FitzSimons, F. W., pp. 127, 128.
1925. Werner, 1924, p. 151.
1937a. FitzSimons, V., p. 263.
1905a. *Calamelaps Mironi* Mocquard, Bull. Mus. Hist. Nat. Paris, **11**, p. 77: Upper Natal.
1925. Werner, 1924, p. 151.

Further citations of "*concolor*" will be found under *u. unicolor* and *u. polylepis*.

Name. Purple-glossed Snake (English).

Description. Rostral nearly twice as broad as deep, the triangular portion visible from above included once and a half to two times in its distance from the frontal; nostril in a semidivided or divided nasal; internasals much broader than long, their median suture half to two-thirds the length of that of the prefrontals; frontal as long as broad (in the middle), shorter than its distance from the rostral, much shorter than the parietals; supraocular small; no loreal[1]; no preocular; eye small, its diameter only half its distance from the mouth; postocular small, sometimes fused with the supraocular; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit, third in contact with the prefrontal, fifth largest and in contact with the parietal; fourth lower labial largest; 4 lower labials in contact with the anterior sub-

[1] The frenal mentioned by Smith, is the posterior nasal.

linguals, which are slightly longer or shorter than the posterior. Midbody scales in 17[1] rows, smooth; ventrals 133[2]–148; anal divided; subcaudals 32–39.

Color. Above and below uniformly black (fading to brown in alcoholic specimens exposed to sunlight) except for the ventrals some, or all, of which may be margined with white posteriorly.

Size. Total length of ♂ (type of *mironi*), 442 (367 + 75) mm., from Upper Natal; total length of ♀ (M.C.Z. 16163), 348 (303 + 45) mm. from Durban, Natal.

Remarks. The alleged type in the Royal Scottish Museum has been discussed by FitzSimons (1937a) who finds that it has 17 (instead of 13 as stated by Smith) midbody scale-rows. Smith's misprint resulted in the description of *mironi* by Mocquard (1905a) subsequently synonymized by Boulenger (1910b). Chubb's (1909b) record of *concolor* from Southern Rhodesia was shown by Hewitt (1913e) to have been based on a misidentified *C. u. polylepis*. My own (1928g) reference to *concolor* was a lapsus for *unicolor*.

The third known specimen (M.C.Z. 16163) of this rare snake was received from the Albany Museum in 1922, identified as *Macrelaps microlepidotus*, a species readily distinguishable by its more numerous midbody scale-rows, which number 25 to 27.

Habitat. A burrowing snake, easily mistaken for the burrowing viper (*Atractaspis bibronii*) found in the same locality, Durban.

Localities. **Natal:** Durban; Kaffraria; Upper Natal.

Range. Natal.

Calamelaps unicolor polylepis Bocage

1873b. *Calamelaps polylepis* Bocage, Jorn. Sci. Lisboa, **4**, p. 216: Dondo, Angola.
1895a. Bocage, p. 126, pl. ix. fig. 2.
1896d. Boulenger, p. 246.
1897a. Bocage, p. 201 (misprinted *Galamelaps*).
1901a. Tornier (part), p. 86.
1904. Ferreira, p. 116.
1910a. Sternfeld, p. 32, fig. 36.
1913e. Hewitt, p. 480.
1915a. Boulenger (part), p. 214.
1915c. Boulenger (part), p. 632.

[1] Said to be 13 in type, considered erroneous by FitzSimons (1937a).

[2] Said to be 134 in type, recounted as 140 by FitzSimons (1937a).

1925. Werner (part), 1924, p. 151.
1937b. Monard, p. 129.
1888b. *Calamelaps miolepis* Günther, Ann. Mag. Nat. Hist. (6), **1**, p. 323: Cape MacLear, Lake Nyasa, Nyasaland.
1891a. Boulenger, p. 307.
1896a. Bocage, p. 103.
1909b. *Calamelaps concolor* Chubb (not Smith), p. 34.
1939b. *Calamelaps unicolor* FitzSimons, V. (not Reinhardt), p. 24.

Names. Angolan Purple-glossed Snake (English).

Description. Differs from *C. u. warreni* only in its more numerous midbody scale-rows which are 21, smooth; ventrals 163–212; anal divided; subcaudals 16–27.

Color: As in *C. u. warreni.*

Size. Total length of supposed ♂, 480 (430 + 50) mm. from Angola (Bocage); total length of supposed ♀, 535 (504 + 31) from Birchenough Bridge surpassed by another of 690 (... + ...) mm. from Empandeni, Southern Rhodesia (Hewitt).

Sexual dimorphism. None of the ten specimens recorded in the literature have been sexed, but they would appear to fall into two groups, viz. supposed ♂♂ with ventrals 163–194, subcaudals 27, and supposed ♀♀ with ventrals 200–212, subcaudals 16–20.

Habitat. A burrowing snake, easily mistaken for the burrowing viper (*Atractaspis congica*) which sometimes occurs in the same localities.

Localities. **Angola:** Cazengo; Dondo; Humbe; Quissangues. **Transvaal:** Hectorspruit (but scale-count not given); near Nylstroom; Palmaryville. **Southern Rhodesia:** Birchenough Bridge; Empandeni. **Nyasaland:** Cape MacLear, i.e. Livingstonia. **Tanganyika Territory:** Tukuyu (Langenburg) at northwest end of Lake Nyasa.

Range. Angola and (?) Transvaal north to extreme southwestern Tanganyika Territory.

Calamelaps unicolor warreni Boulenger

?1896a. *Calamelaps unicolor* Bocage (not Reinhardt), p. 94.
1901a. Tornier (part), p. 86.
1933h. Loveridge (part), p. 260.
1936j. Loveridge (part), p. 267.
1937. Pitman (part), p. 326.
1938a. Pitman (part), p. 217.
1938b. Pitman (part), pp. 40, 179, 315 (reprint).

?1908c. *Calamelaps polylepis* Sternfeld (not Bocage), p. 247.
1915a. Boulenger (part), p. 214.
1915c. Boulenger (part), p. 632.
?1921a. Angel, p. 42.
1923e. Loveridge, p. 889.
1925. Werner (part), 1924, p. 151.
?1934. Pitman, p. 298.
1908b. *Calamelaps warreni* Boulenger, Ann. Natal Mus., **1**, pp. 230, 234, fig. 3: Kosi Bay, Zululand.
1910b. Boulenger, p. 516.
1912. FitzSimons, F. W., pp. 127, 128.
1912. Hewitt, p. 276.
1913e. Hewitt, p. 480.
1925. Werner, 1924, p. 151.
1928. Cott, p. 953.
1935. Cott, p. 970.
1915a. *Calamelaps mellandi* Boulenger, Proc. Zool. Soc. London, p. 214: Chirini Island, Lake Bangweulu, Northern Rhodesia.
1925. Werner, 1924, p. 151.
1934. Pitman, p. 298.
1942e. *Calamelaps unicolor warreni* Loveridge, p. 295.

Names. Eastern Purple-glossed Snake (English); *ngogoma* (Pokomo); *mbitu* (Makonde, but not specific); *nyeresi* (Nyakusa).

Description. Rostral once and three quarters to twice as broad as deep, the triangular portion visible from above as long as, or nearly as long as, its distance from the frontal; nostril in a semidivided or divided, rarely entire,[1] nasal; internasals much broader than long, their median suture as long as, or longer than, that of the prefrontals; frontal once and a third to once and two thirds as long as broad (in the middle), longer than its distance from the end of the snout, much shorter than the parietals; supraocular small; no loreal; no preocular; eye small, its diameter less than half its distance from the mouth; postocular small, rarely absent[2] through fusion with the supraocular; temporal 1 only; upper labials 6, rarely 5, the third and fourth entering the orbit, third, rarely second and third[2] or only second[3], in contact with the prefrontal, fifth, rarely fourth[3], largest and in contact with the parietal; fourth lower labial largest; 4 lower labials in contact with the anterior sublinguals, which are much longer than the posterior which are often scarcely differentiated. Midbody scales in 19 rows, smooth; ventrals 161–203; anal divided; subcaudals 17–30.

[1] In type of *warreni*.
[2] In type of *warreni*.
[3] In type of *mellandi*.

Color. Above and below uniformly iridescent black (fading to brown in alcoholic specimens exposed to sunlight) or opaque bluish gray when about to slough.

Size. Total length of ♂ (M.C.Z. 30399), 475 (430 + 45) mm. from Mwaya; total length of ♀ (M.C.Z. 48428), 670 (630 + 40) mm. from Mbanja.

Remarks. This form with 19 midbody scale-rows, being intermediate between *unicolor* and *polylepis* was at first united with one, and then the other, of these forms until Boulenger described *warreni* in 1908 on an individual which was not wholly typical. The characters on which he founded *C. mellandi*, viz. absence of postocular, second supralabial in contact with prefrontal and fourth with parietal, also occur spasmodically in the typical form, which, however, has 17 midbody scale-rows. I placed *mellandi* in the synonymy of *warreni* in 1942.

Sexual dimorphism. ♂♂ with ventrals 161–177, subcaudals 26–30, and ♀ ♀ with ventrals 179–209, subcaudals 17–22.

Habitat. A burrowing species, readily mistaken for one or other of the very venomous burrowing vipers (*Atractaspis*) occurring within its range. It has been found wandering above ground in the early morning after a night of rain.

Localities. **Zululand:** Kosi Bay. **Transvaal: Southern Rhodesia:** Empandeni. **Northern Rhodesia:** Chirini Id., Lake Bangweulu; Lealui; Sesheke. **Mozambique:** Caia; Chifumbazi; Lumbo. **Tanganyika Territory:** Amboni Estate near Tanga; Mbanja; Morogoro (? as found bottled in house); Mwaya; Nchingidi; Tanga. **Kenya Colony:** Ngatana, Tana River.

Range. Zululand and Southern Rhodesia (at Empendeni, where it meets with *polylepis*) north to Kenya Colony (at Ngatana.).

Calamelaps unicolor unicolor (Reinhardt)

1843. *Calamaria unicolor* Reinhardt, K. Danske Vidensk. Selsk. Afhandl.' **10**, p. 236, pl. i, figs. 1–3: Gunea ,West Africa.
1862. *Amblyodipsas unicolor* Jan, p. 41.
1896. Tornier, p. 79.
1877c. *Atractaspis Hildebrandtii* Peters, Monatsb. Akad. Wiss. Berlin, p. 616, pl. –, fig. 3: Zanzibar coast.
1896d. Boulenger, p. 512.
1898. Boettger, p. 136.
1901a. Tornier, p. 85.
1912. Hobley, p. 56.

1913. Boettger, p. 353.
1866a. *Calamelaps unicolor* Günther, p. 25.
1893. Pfeffer, p. 77.
1896d. Boulenger, p. 245.
1897. Tornier, p. 65.
1901a. Tornier (part), p. 85.
1902a. Boulenger, p. 447.
1908b. Sternfeld, pp. 219, 233.
1909a. Sternfeld, p. 22.
1910a. Sternfeld, p. 32.
1911c. Boulenger, p. 166.
1915c. Boulenger, p. 632.
1919b. Boulenger, p. 291.
1922. Aylmer, p. 15.
1923. Schmidt, p. 116.
1924b. Loveridge, p. 7.
1925. Werner, 1924, p. 151.
1928c. Barbour & Loveridge, p. 130.
1933f. Angel, p. 170, figs. 64–64a.
1933m. Witte, p. 95.
1936j. Loveridge (part), p. 267.
1937f. Loveridge, pp. 493, 496.
1937. Pitman (part), p. 326, pl. xii, fig. 2; pl. M, fig. 2.
1938a. Pitman (part), p. 217.
1938b. Pitman (part), pp. 40, 179, 315 & pls. as above (reprint).
1923. *Calamelaps niangarae* Schmidt, Bull. Am. Mus. Nat. Hist., **49**, p. 117, fig. 12: Niangara, Belgian Congo.
1928g. *Calamelaps concolor* Loveridge (not Smith), p. 41 (*lapsus* for *unicolor*.)

A further citation of "*unicolor*" will be found under *u. polylepis*.

Names. Equatorial Purple-glossed Snake (English).

Description. Rostral once and a half to nearly twice as broad as deep, the triangular portion visible from above as long as, or nearly as long as, its distance from the frontal; nostril in a semidivided or divided, rarely entire, nasal; internasals much broader than long, their median suture as long as, or shorter, or longer[1] than the length of that of the prefrontals; frontal once and a quarter to once and two thirds as long as broad (in the middle), as long as, or longer than, its distance from the end of the snout, much shorter than the parietals; supraocular small; no loreal; no preocular; eye small, its diameter only half its distance from the mouth; postocular small, rarely absent

[1] In types of *hildebrandtii* and *niangarae*.

through fusion with the supraocular; temporal 1 only; upper labials 6, rarely 5[1], the third and fourth, rarely second and third, entering the orbit, third, rarely second, in contact with the prefrontal, fifth, rarely fourth, largest and in contact with the parietal; fourth lower labial largest; 4 lower labials in contact with the anterior sublinguals, which are much longer than the posterior, which are often scarcely differentiated. Midbody scales in 17 rows, smooth; ventrals 164–208: anal divided; subcaudals 21–38.

Color. Above and below uniformly iridescent black (fading to brown in alcoholic specimens exposed to sunlight) or opaque bluish gray when about to slough.

Size. Total length of ♂ (type of *niangarae*), 414 (366 + 48) mm. from Niangarae; total length of ♀ (A.M.N.H.), 722 (672 + 50) mm. from Faradje.

Remarks. Tornier (1901a) was the first to synonymize *Atractaspis hildebrandtii* with *unicolor.* Accorinti's (1913, p. 300) record of it from Eritrea, however, obviously refers to a true viper and not to a *Calamelaps.* In 1925 Werner (1924, p. 151) synonymized *niangarae,* a species which was thought to differ from *unicolor* because the median suture of its internasals was longer (instead of as long as, or shorter) than that between the prefrontals. In this, however, it agreed with *hildebrandtii.* Its other supposed differences were chiefly those of sex, and it is interesting to note that Boulenger (1896d) had recorded a Sierra Leone specimen with exactly the same ventral and subcaudal counts as had the type of *niangarae.* Witte (1933m) has since obtained *unicolor* at Niangara.

As a result of Tornier's remarks and records, Barbour and Loveridge (1928c) added *polylepis* to the synonymy of *unicolor,* but now, with additional material, and after a study of all the literature, the true position begins to emerge of forms occupying definite geographical areas, though a good deal of overlapping occurs where the western and eastern forms meet.

Sexual dimorphism. ♂♂ with 164–182 ventrals, 28–38 subcaudals, and ♀ ♀ with 201–208 ventrals, 17–21 subcaudals.

Diet. A wolf snake (*Lycophidion c. acutirostre*) was disgorged by an Equatorial Purple-glossed Snake shortly after capture, the prey being only 20 mm. shorter than the predator. The similarity in the parallel development of these two blackish, burrowing snakes was striking, the prey having nine ventrals fewer, and four subcaudals more, than its

[1] These rare labial variations in a snake from Mt. Mbololo.

vanquisher at Changamwe. A skink (*Lygosoma kilimensis*) in a Nyange snake, a snake (*Aparallactus werneri*) and a caecilian (*Boulengerula boulengeri*) in Amani specimens.

Defence. The fact that Peters, overlooking the absence of poison fangs, described this snake as a viper, and was followed by Boulenger, Boettger and others who identified fresh material with *hildebrandtii.* is sufficient and eloquent proof of the close superficial resemblance between the two genera, making it essential when capturing *Calamelaps* to treat them as if they were indeed dangerous vipers.

Habitat. A burrowing species of which several were taken in clearing land at Amani, while another was hoed up in a native garden at Nyange. This race seems to be chiefly associated with forested, or recently deforested, areas at altitudes below 3,000 feet.

Localities. Bocage's (1896a) and Sternfeld's (1908c) records for Mozambique have been arbitrarily transferred to *C. u. warreni* as other Mozambique material, whose scales could be counted, were referable to that race.

Tanganyika Territory: Amani, Usambara Mtns.; Bagamoyo (Pfeffer, requires checking); Nyange, Uluguru Mtns.; Tanga. **Kenya Colony:** Changamwe; Mombasa; Mount Mbololo; Peccatoni. **Uganda:** Bussu; Kampala. **Belgian Congo:** Faradje; Niangara. **Nigeria: Togo. Gold Coast. Sierra Leone. Guinea.**

Range. Tanganyika Territory (Uluguru Mountains) north to Kenya Colony (at Peccatoni, *fide* Boettger) west to Sierra Leone and "Guinea."

Calamelaps unicolor feae Boulenger

1906i. *Calamelaps feae* Boulenger, Ann. Mus. Civ. Stor. Nat. Genova, (3), **2**, p. 214, fig. 9: Rio Cassine, Portuguese Guinea.
1919b. Boulenger, p. 291.
1925. Werner, 1924, p. 151.
1933f. Angel, p. 171.

Names. Western Purple-glossed Snake (English).

Description. Rostral once and a half as broad as deep, the triangular portion visible from above as long as its distance from the frontal; nostril in a divided nasal; internasals much broader than long, their median suture longer than that of the prefrontals; frontal once and a third as long as broad (in the middle), longer than its distance from the end of the snout, much shorter than the parietals; supraocular small; no loreal; no preocular; eye small, its diameter only half its distance

from the mouth; postocular small; temporal 1 only; upper labials 5, the second and third entering the orbit, second in contact with the prefrontal and posterior nasal, fourth largest and in contact with the parietal; fourth lower labial largest; 4 lower labials in contact with the anterior sublinguals, which are much longer than the posterior which may be scarcely differentiated. Midbody scales in 15 rows, smooth; ventrals 196; anal divided; subcaudals 23.

Color. Above and below uniformly iridescent black (fading to brown in alcoholic specimens exposed to sunlight).

Size. Total length of *alleged* ♂, 610 (560 + 50) mm. Type.

Remarks. Known only from the type, said to be a male. The above description is based on the original and on the figures.

Localities. **Portuguese Guinea:** Rio Cassine.

Range. Portuguese Guinea.

Genus Miodon

1858. *Microsoma* Jan (not Mocquart), Revue Mag. Zool. (2), **10**, p. 519 (type *neuwiedii* Jan).

1859. *Miodon* A. Duméril, Arch. Mus. Hist. Nat. Paris, **10**, p. 206 (type *Elapomorphus gabonensis* A. Duméril).

1860. *Urobelus* Reinhardt, Vidensk. Meddel. Kjobenhavn, p. 229 (type *acanthias* Reinhardt).

1902a. *Cynodontophis* Werner, Verh. Zool.-Bot. Ges. Wien, **52**, p. 346 (type *aemulans* Werner = *notatus* Peters).

Maxillary very short with 2–4 teeth followed after an interspace by 1–2 large grooved fangs situated in advance of the eye; second and third, or third and fourth, mandibular teeth enlarged, fang-like. Head small, not distinct from neck; eye very small, with round pupil; nasal entire or divided, not in contact with the rostral, the internasal forming a suture with the first labial; no loreal; 1 preocular. Body cylindrical; scales smooth, without pits, in 15 rows; ventrals rounded. Tail very short; subcaudals in two rows.

Range. Africa in forested areas of equatorial belt from Liberia east to Uganda and western Tanganyika Territory.

Remarks. Microsoma of Jan is antedated by that of Mocquart, 1854 (Ann. Soc. Ent. France (3), **2**, p. 737) proposed for a genus of Diptera. *Cynodontophis* was originally believed to differ from *Miodon* in dentition. Bogert (1940, p. 46) has shown, however, that such differences were due to fang replacement; his remarks on the subject should be consulted. This author also describes the hemipeneal structure.

Key to the Species

1. Anal entire; dorsum with pattern of 5 parallel black lines; ventrals 183–216; subcaudals 16–22; range Sierra Leone to Togoland (or Nigeria, *fide* Angel) ..... *acanthias* (p. 170)

   Anal divided[1] 2

2. Dorsum with pattern of 3 parallel black lines; ventrals 219–246; subcaudals 11–21; range Gold Coast to Dahomey (with type allegedly from Gabon, *i.e.* French Congo) ..... *g. gabonensis* (p. 172)

   Dorsum without pattern of parallel black lines 3

3. Dorsum with pattern of 2 parallel series of black spots; ventrals 178–228; subcaudals 14–19; range French Cameroon south to French Congo ..... *g. notatus* (p. 173)

   Dorsum uniformly dark 4

4. Nape and crown pale fawn with dark mottlings; throat white; ventrals 181–252; subcaudals 15–25; range (Togo[1] *fide* Werner) southeastern Nigeria south to Angola east to Uganda (west of Ruwenzori) *g. collaris* (p. 175)

   Nape and crown of head entirely black, or with a sharply distinct broad white band across the parietal region 5

5. Top of head iridescent black like nape and dorsum; throat white or black; ventrals 202–241; subcaudals 15–21; range western Congo (Poko) east to central Uganda (Mabira Forest) and western Tanganyika *g. christyi* (p. 178)

   Top of head from snout to behind eyes, black, posterior half of head and nape pure white; ventrals 237–258; subcaudals 13–18; range western Congo (Idjwi Island, Lake Kivu) to central Uganda (Entebbe) *g. graueri* (p. 180)

Miodon acanthias (Reinhardt)

1860. *Urobelus acanthias* Reinhardt, Vidensk. Meddel. Kjobenhavn, p. 229 pl. iii: Guinea.
1893c. Matschie, p. 213.
1863. *Elapomorphus acanthias* Jan, p. 47.
1863. Jan, p. 39.
1865. Jan, livr. 14, pl. iii, fig. 4.
1888b. Günther (part), p. 323.

[1] Allegedly entire in a Congo specimen of *M. g. collaris*, *fide* Bocage (1895a, p. 126)

1896d. *Miodon acanthias* Boulenger, p. 250.
1908b. Sternfeld, pp. 219, 233.
1909a. Sternfeld, p. 22.
1915a. Boulenger, p. 215.
1919b. Boulenger, p. 291.
1922. Aylmer, pp. 15, 22.
1925. Werner, 1924, p. 152, fig. 13.
1930a. Barbour & Loveridge, p. 773.
1933f. Angel, p. 173.
1941e. Loveridge, p. 123.

Name. Five-striped Snake-eater (English).

Description. Rostral broader than deep, just visible from above; nostril in a divided or entire nasal, separated from rostral; internasals as broad as long, two-thirds to three-quarters the length of the prefrontals; frontal as long as, or once and two-thirds as long as, broad, as long as, or longer or shorter than, its distance from the rostral, much shorter than the parietals, once and a half to twice as broad as a supraocular; no loreal; preocular 1; eye small, its diameter half to two-thirds its distance from the mouth; postoculars 1–2; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit; 4 lower labials in contact with the anterior sublinguals, which are longer than the posterior. Midbody scales in 15 rows, smooth; ventrals 183–216; anal entire; subcaudals 16–22 pairs.

Based on original descriptions, the literature, 8 Liberian specimens in the M.C.Z. and 1 in the U.S.N.M.

Color. Above, head more or less black, snout, upper lip, and an occipital bar white (reddish in life); a black nuchal band; dorsum pale reddish (Brazil red in life) with five longitudinal black stripes on body, three on tail, tip of tail white (reddish in life). Below, white (Bittersweet orange in life). The colors in life are from Ridgway and were based on a Liberian snake as noted by G. M. Allen.

Size. Total length of ♂ (M.C.Z. 22525), 514 (475 + 39) mm. from Nickabo; total length of ♀ (M.C.Z. 22524), 585 (555 + 30) mm. from Gbanga.

Sexual dimorphism. Assuming the two types to have been females, then ♂♂ have 183–195 ventrals, and 22 subcaudals, and ♀♀ have 207–212 ventrals, and 16–18 subcaudals, this being based on five males and five females.

Breeding. Between April 10–16, at Gibi, a ♀ held 4 eggs, each measuring *circa* 22 x 7 mm.

Localities. **Liberia:** Du River; Gbanga; Gibi Si Mountain;

Nickabo; Paiata. **Gold Coast:** Ashanti. **Togoland:** Misahöhe. **Nigeria** (*fide* Angel).

Range. Sierra Leone east to Nigeria.

Miodon gabonensis gabonensis (Duméril)

1856c. *Elapomorphus gabonensis* A. Duméril, Revue Mag. Zool. (2), **8**, p. 468: Gaboon.
1859. Duméril, A., p. 206, pl. xvi, fig. 2.
1884b. Sauvage, p. 201.
1858. *Microsoma neuwiedi* Jan, Revue Mag. Zool. (2), **10**, p. 519: Christiansborg, Gold Coast.
1859. Jan, pl. iv.
1866. *Elapomorphus* (*Urobelus*) *neuwiedi* Jan, livr. 15, pl. i, fig. 2.
1884a. *Miodon gabonense* Rochebrune, p. 153, pl. xvii, fig. 1: (the figure is of *gabonensis* but text is ignored).
1909a. Sternfeld, p. 22.
1896d. *Miodon neuwiedii* Boulenger, p. 253.
1908b. Sternfeld, pp, 219, 234.
1909a. Sternfeld, p. 22.
1917. Chabanaud, p. 377.
1917b. Chabanaud, p. 12.
1925. Werner, 1924, p. 153.
1933f. Angel, p. 173, figs. 65–65a.

Further citations of '*gabonensis*' will be found under *g. collaris* and *g. christyi*.

Name. Three-striped Snake-eater (English).

Description. Rostral slightly broader than deep, just visible from above; nostril in an entire nasal; internasals as broad as long, slightly shorter than the prefrontals; frontal as long as, or longer than, broad, as long as its distance from the rostral, much shorter than the parietals, nearly twice as broad as a supraocular; no loreal; preocular 1; eye small, its diameter two-thirds its distance from the mouth; postoculars 1–2; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit; 3 or 4 lower labials in contact with the anterior sublinguals, which are slightly shorter than the posterior. Midbody scales in 15 rows, smooth; ventrals 219–246 (*fide* Angel); anal divided; subcaudals 11–21 pairs.

Based on original descriptions and figures; no material seen.

Color. Above, head black; back pale brown with three longitudinal black stripes; tail black. Below, white.

Size. Total length of type 550 (510 + 40) mm. allegedly from Gaboon, and (type of *neuwiedii*), 172 (162 + 10) mm. from Christiansborg.

Remarks. Both Duméril and Jan have figured their reptiles showing that both have three prominent black stripes running the entire length of the dorsum. With the exception of Sternfeld and Chabanaud, no one appears to have received true *gabonensis,* by which I mean a striped snake.

Boulenger, when writing the Catalogue of Snakes (1896d), referred to *gabonensis* material which I consider identical with *collaris,* for he had no representatives of either true (striped) *gabonensis* or *neuwiedi,* though recognizing the latter by trivial characters which are demonstrably variable in any large series of *collaris.*

I am uncertain if it is wise to treat *collaris* as a race of *gabonensis* for the ranges appear to overlap, this would be especially the case if the type of the latter actually came from the Gaboon. On the other hand to treat as full species snakes which differ only in color and pattern, would seem retrogressive.

Localities. **Gold Coast:** Christiansborg. **Togo:** Klein Popo. **Dahomey:** Agouagou. **French Congo** as Gaboon.

Range. Gold Coast east to Dahomey (and ? French Congo).

Miodon gabonensis notatus (Peters)

1882d. *Microsoma notatum* Peters, Sitz. Ges. Naturf. Freunde Berlin, p. 127: No locality.
1887b. Mocquard, p. 64.
1896d. *Miodon notatus* Boulenger, p. 252.
1897. Sjöstedt, p. 35.
1898. Werner, p. 212.
1908a. Sternfeld, pp. 414, 429.
1909b. Sternfeld, p. 22.
1910. Müller, p. 609.
1915a. Boulenger, p. 215.
1919b. Boulenger, p. 292.
1925. Werner, 1924, p. 153.
1940. Bogert, p. 46.
1902a. *Cynodontophis aemulans* Werner, Verh. Zool.-Bot. Ges. Wien, **52**, p. 346: Congo.
1910. Müller, p. 610.
1915a. Boulenger, p. 215.
1923. Schmidt, p. 120.
1925. Werner, 1924, p. 153.

Further citation of '*notatus*' will be found under *g. collaris.*

Name. Spotted Snake-eater (English).

Description. Rostral broader than deep, just visible from above; nostril in a divided nasal, separated from[1], or in contact with[2], the rostral; internasals longer than broad, as long as, or two-thirds as long as, the prefrontals; frontal longer than broad, as long as its distance from the rostral, much shorter than the parietals, twice as broad as a supraocular; no loreal; preocular 1; eye small, its diameter half to two-thirds its distance from the mouth; postoculars 1–2; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit; 3 lower labials in contact with the anterior sublinguals, which are as long as, or longer than, the posterior. Midbody scales in 15 rows, smooth; ventrals 178–228; anal divided; subcaudals 14–19 pairs.

Based on original descriptions, the literature, and one specimen.

Color. Above, head and nuchal collar black; back light brown with a double series of black spots which may be light-edged; tail black. Below, white (yellow in life?).

Size. Total length, 317 (288 + 29) mm. from Brazzaville.

Remarks. Andersson (1901) advocated the uniting of *notatus* with *gabonensis* but lacked material of both. Sternfeld (1908a), with *notatus* material, objected, though the characters with which he supported this view have since proved to be variable.

Müller (1910) referred *aemulans* to the synonymy of *notatus* but proposed to retain the genus *Cynodontophis.* Boulenger (1915a) retained both species and genera, separating *Cynodontophis* on the nasal being in contact with the rostral — which is not the case with our Cameroon specimen (M.C.Z. 14995) and is variable in the M.C.Z. series of *gabonensis collaris.*

Schmidt (1923) and Werner (1925) agree with the synonymizing of the species, but suggest that the genus should be retained. Bogert (1940), after a thorough study of the dentition in *g. collaris*, found that the alleged differences between *Miodon* and *Cynodontophis* were due to fang replacement and that *Cynodontophis* could not be retained.

Witte (1933m) referred six specimens from Kunungu, Belgian Congo, to *notatus* one of which is now M.C.Z. 42957. It is a typical *g. collaris* in coloration and it may be safely assumed that the others are the same for he recorded both *gabonensis* and *collaris* from Kunungu in the same paper.

Sexual dimorphism. None of the material mentioned in the literature is sexed, a Cameroon ♀ in the M.C.Z. has 201 ventrals and 14 subcaudals. Males probably have a range from 17–19.

[1] In type of *notatus.*

[2] In type of *aemulans.*

Localities. **French Cameroon:** Barombi; Bipindi; Dibongo near Edea; Kribi; Sakbayeme. **French Congo:** Brazzaville; Cap Lopez. (Recorded from **Belgian Congo:** Kunungu by Witte (1933m) in error).

Range. French Cameroon and adjacent French Congo.

Miodon gabonensis collaris (Peters)

1862. *Elapomorphus gabonicus* Jan (not Duméril), p. 47.
1866. Jan, livr. 15, pl. i, fig. 1.
1865a. *Polemon barthii* Günther (not Jan), p. 90.
1881d. *Microsoma collare* Peters, Sitz. Ges. Naturf. Freunde Berlin, p. 148; Macange, Cuango = Kwango, French Equatorial Africa.
1887a. Bocage, p. 182.
1895a. Bocage, p. 124, pl. xiv, figs. 1–2.
1895c. Bocage, p. 13.
1903a. Bocage, p. 44.
1887b. *Urobelus gabonicus* Boulenger, p. 127.
1887b. *Microsoma fulvicollis* Mocquard, Bull. Soc. Philom. Paris (7), **11**, p. 65: Franceville, French Congo.
1888b. *Elapomorphus acanthias* Günther (not Reinhardt), p. 323.
1888b. *Elapomorphus caeutiens* Günther, Ann. Mag. Nat. Hist. (6), **1**, p. 323, pl. xix, fig. B: Cameroon Mountains, British Cameroons.
1896d. *Miodon collaris* Boulenger, p. 251.
1897b. Mocquard, p. 13.
1900b. Boulenger, p. 454.
1903. Gough, p. 468.
1905c. Boulenger, p. 114.
1905. Ferreira, p. 169.
1908a. Sternfeld, p. 413.
1911. Lampe, p. 202.
1915a. Boulenger, p. 215.
1919b. Boulenger, p. 291.
1923. Schmidt, p. 120.
1933m. Witte, p. 95.
1937b. Monard, p. 129.
1896d. *Miodon gabonensis* Boulenger (part: no material), p. 252.
1897. Sjöstedt, p. 35.
1897b. Werner, p. 400.
1898a. Werner, p. 211.
1899a. Werner, p. 140.
1900b. Boulenger, p. 454.
1901. Andersson, p. 23.
1908a. Sternfeld, pp. 413, 428.

1909b. Sternfeld, p. 22.
1910. Müller, p. 609.
1911. Lampe, p. 202.
1915a. Boulenger, p. 215.
1915c. Boulenger, p. 633.
1917. Sternfeld, p. 480.
1919b. Boulenger, p. 291.
1919g. Boulenger, p. 26.
1923. Schmidt, p. 118.
1925. Werner, 1924, p. 153.
1932b. Witte, p. 14.
1933f. Angel, p. 175.
1933. Schouteden, p. 236.
1933m. Witte, p. 95.
1940. Bogert, p. 45.
1908b. *Miodon gabonensis* var. *collaris* Sternfeld, pp. 219, 234.
1910. *Cynodontophis werneri* Müller, Abh. Bayer Akad. Wiss., 2 Kl., **24**, p. 612: Cameroons?
1933m. *Miodon notatus* Witte (not Peters), p. 95.
1942e. *Miodon gabonensis collaris* Loveridge, p. 298.

Name. Pale-collared Snake-eater (English).

Description. Rostral broader than deep, just visible from above; nostril in a semidivided, divided, or entire nasal; internasals as broad as long, as long as, or almost as long as, the prefrontals; internasal and prefrontal in contact with, or separated from the labials; frontal longer than broad, as long as, or shorter than, its distance from the rostral, much shorter than the parietals, once and a half to twice as broad as a supraocular; no loreal; preocular 1; eye small, its diameter half[1] to three-quarters its distance from the mouth; postoculars 2, rarely 1; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit; 4, very rarely 3, lower labials in contact with the anterior sublinguals, which are as long as, or longer than, the posterior. Mid-body scales in 15 rows, smooth; ventrals 181–252; anal divided[2]; subcaudals 15–25 pairs.

Based on original descriptions, all data in literature, and much material in A.M.N.H., C.N.H.M. and M.C.Z.

Anatomy. For discussion on dentition and description of hemipenes, see Bogert (1940).

Color. Above, head and nape pale brown or fulvous with some black blotches on the snout or crown and below the eye; back bluish black or slaty gray, the scales edged with darker; tip of tail white.

[1] A third to equal according to some authors.
[2] Entire in one Congo snake according to Bocage (1895a, p. 126).

Below, white, except for some dusky markings on the chin and the dorsal color impinging on the outer (lateral) edges of the ventrals, or throat white and rest of under surface black (in an Angolan specimen. M.C.Z. 32593).

Size. Total length of ♂ (A.M.N.H. 12452), 535 (501 + 34) mm. from Medje; total length of ♀ (M.C.Z. 13606), 661 (630 + 31) mm. from Niapu, but exceeded by an unsexed specimen, though almost certainly a ♀, recorded as 860 (818 + 42) mm. by Sternfeld, which is probably the Togo snake of 850 (808 + 42) mm. of Werner (1897b).

Remarks. As indicated under *M. g. gabonensis*, I am of the opinion that it may prove possible to separate two forms which have long been confused, and that the overlap in ranges between the striped *gabonensis* and the pale-collared *collaris* may not prove to be so great as has been supposed.

Boulenger (1896d) synonymized *fulvicollis* and *cacutiens* with the composite which he called *gabonensis*. Bogert (1940) would add both *collaris* and *werneri* but he had in mind the composite rather than the striped snake of Duméril, for apart from this his remarks form the most important contribution to our understanding of the genus in recent times.

Sexual dimorphism. Using the sexed (but unchecked) records in the literature, ♂♂ have 200–232 ventrals, and 19–25 subcaudals, while ♀♀ have 195–252 ventrals, and 16–19 subcaudals, this being based on five males and twelve females; 19 subcaudals is correct for both sexes, being found in M.C.Z. material.

Diet. A snake, 180 mm. in length but with head digested, in a 230 mm. *collaris* from the Congo (Schmidt).

Parasites. Two large linguatulids in lungs of a Metet snake (Bogert).

Habitat. Apparently associated with virgin forest.

Localities. **Togo** (based on a single specimen collected by Buttner, recorded by Werner (1897b) and repeated by Sternfeld (1908a–b), it may well be regarded as doubtful pending confirmation by fresh material from Togo). **Nigeria:** Old Calabar. **British Cameroon:** Bibundi; Cameroon Mountains; Cape Debundscha; Isongo; Mapanja; Rio del Ray; Victoria. **French Cameroon:** Bipindi; Bitye; Dibongo near Edea; Kribi; Lekungg River; Lolodorf; Longji; Metet. **Fernando Po: Spanish Guinea:** Esong (or Eosung) near Bakossiberge. **French Congo:** Franceville; Lambarene. **Angola:** Cazengo; Golungo Alto; Missao de Donda; Pungo Adungo; Quindumbo. **French Equatorial Africa:** Macange, Kwango. **Belgain Congo:** Duma; Goma (Ngoma);

Kunungu; Medje; Moanda; Mocra; Niangara; Niapu; Nyampoko; Panga, Aruwimi River; Sandoa; Stanleyville. **Uganda:** Bundibugyo, northwest of Ruwenzori Mountains.

Range. Togo?, certainly southeastern Nigeria, south to Angola and east to Uganda (northwest of Ruwenzori Mountains).

Miodon gabonensis christyi Boulenger

1903f. *Miodon Christyi* Boulenger, Ann. Mag. Nat. Hist. (7), **12**, p. 354: Uganda.
1910a. Sternfeld, p. 34 (as *Chrystii*).
1911c. Boulenger, p. 166.
1915c. Boulenger, p. 633.
1924b. Loveridge, p. 7.
1925. Werner, 1924, p. 153.
1937f. Loveridge, p. 502.
1937. Pitman, p. 332, pl. xii, fig. 3, col. pl. M, fig. 3.
1938a. Pitman, pp. 217, 233.
1938b. Pitman, pp. 40, 185, 187, 188, 315, 331 and plates as above (reprint).
1910a. *Miodon gabonensis* Sternfeld (not Duméril), p. 34.
1924b. Loveridge, p. 7.
1933h. Loveridge, p. 261.
1936h. Loveridge, p. 40.
1937f. Loveridge, p. 502.
1938a. Pitman, p. 217.
1938b. Pitman, pp. 186, 187, 315 (reprint).
1923. *Miodon unicolor* Schmidt, Bull. Am. Mus. Nat. Hist., **49**, p. 119, fig. 13: Poko, Belgian Congo.
1925. Werner, 1924, p. 153.

Name. Eastern Snake-eater (English).

Description. Rostral broader than deep, just visible from above; nostril in a divided[1] or entire[2] nasal; internasals longer than broad, shorter than the prefrontals; frontal slightly longer than broad, as long as[1], or shorter than[2], its distance from the rostral, much shorter than the parietals, broader than a supraocular; no loreal; preocular 1; eye small, its diameter half to three-fifths its distance from the mouth; postoculars 2; temporals 1 + 1, rarely 1 only[2]; upper labials 7, the third and fourth entering the orbit, rarely the fifth[3] or the seventh[2] in contact with the parietals; 4 lower labials in contact with the anterior

[1] In type of *unicolor* from Poko.
[2] In type of *christyi* from Uganda.
[3] In specimen from Mambawanga Hill.

sublinguals, which are longer than the posterior. Midbody scales in 15 rows, smooth; ventrals 202–241; anal divided; subcaudals 15–24 pairs.

Based on original descriptions and figures, data in literature cited, and three specimens from Congo, Uganda and Tanganyika.

Color. Above, black with an iridescent bluish bloom. Below, uniform with dorsum or throat only black or white; ventrals and subcaudals dull creamy- or dirty white broadly margined with black laterally, or mainly black with their posterior edges mottled with white.

Size. Total length of ♂, 661 (617 + 44) mm. from Mambawanga Hill; total length of type of *christyi*, allegedly a ♀, 430 (402 + 28) mm.

Remarks. In the extreme eastern part of its range, *M. g. collaris* shows a marked tendency to melanism, several males being uniformly black like a *Calamelaps* while other specimens have the black ventrals mottled with white on the posterior edges (as in *unicolor*) or have retained the light ventrals but more or less broadly edged with black (as in *christyi*). All, however, would appear to have the head, nape and dorsum uniformly colored so I have utilized this rather slender distinction to retain the name *christyi* for these eastern snakes. Perhaps additional material will show it to be untenable.

Sternfeld (1910a) had no material of *christyi*, all his descriptions being translations into German from Boulenger, a point that Pitman has not realized in retranslating back to English. While Sternfeld's text regarding *gabonensis* is taken from Boulenger, I regard his record of a specimen from Dar es Salaam with misgiving until it is verified, it is more probably a *Calamelaps*. If it is correct it extends the range 400 miles to the east and introduces into the coastal zone a species usually associated with forested areas.

Sexual dimorphism. Assuming that the type of *christyi* is a male, then ♂♂ have 202–217 ventrals, and 19–24 subcaudals, and ♀♀ have 221–241 ventrals, and 15–18 subcaudals, this being based on seven (four supposedly so) males and three females.

Diet. The tip of a blind snake's (*Typhlops* or *Leptotyphlops*) tail was present in the stomach of the Ilolo snake.

Habitat. Associated with forested or recently deforested land such as at Mbango, where Pitman's natives secured one while clearing thickets of "lantana" from an old rubber plantation. A burrowing species occurring at altitudes of 4000 (Mubango) to 4600 (Ilolo) feet.

Localities. **Belgian Congo:** Mambawanga Hill; Poko. **Uganda:** Budongo Forest; Bussu; Katebo, n.w. Lake Victoria; Kilembe, e. of Ruwenzori Mountains; Mubango, Mabira Forest. **Tanganyika**

Territory: Ilolo; ? Dar es Salaam (see comments regarding this record under the heading of Remarks).

Range. Belgian Congo (in extreme east) east to Uganda and Tanganyika Territory (in extreme west).

Miodon gabonensis graueri Sternfeld

1908. *Miodon Graueri* Sternfeld, Sitz. Ges. Naturf. Freunde Berlin, p. 94: Entetbe, *i.e.* Entebbe, Uganda.
1908c. Sternfeld, p. 244, fig.
1910a. Sternfeld, p. 35, fig. 40.
1915c. Boulenger, p. 633.
1924b. Loveridge, p. 7.
1925. Werner, 1924, p. 153.
1937. Pitman, p. 334, pl. xii, fig. 4; col. pl. M, fig. 4.
1938b. Pitman, pp. 40, 187, plates as above (reprint).
1942e. *Miodon gabonensis graueri* Loveridge, p. 298.

Name. Central Lake Region Snake-eater (English).

Description. Rostral nearly twice as broad as deep, just visible from above; nostril in a divided nasal; internasals as broad as long, as long as, or almost as long as, the prefrontals; frontal as long as, or longer than, broad, as long as, or shorter than, its distance from the rostral, much shorter than the parietals, once and a half to twice as broad as a supraocular; no loreal; preocular 1; eye small, its diameter half to two-thirds its distance from the mouth; postocular 2; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit; 4 lower labials in contact with the anterior sublinguals, which are longer than the posterior. Midbody scales in 15 rows, smooth; ventrals 237–258; anal divided; subcaudals 13–18 pairs.

Based on data of type and examination of the three Idjwi snakes.

Color. Above, black with an iridescent bloom; a broad white band crosses head and nape, extending from the back of the frontal across the parietals and over three scale-rows on the nape. Below, and on lower half of outer scale-rows, white.

Size. Total length of ♂ (Mus. Congo), 325 (310 + 15) mm.; total length of ♀ (M.C.Z. 48432), 370 (358 + 12) mm.; both from Idjwi Island.

Remarks. The species is known only from the type, apparently a ♂; and three others (♂ ♀ ♀) which I collected on Idjwi Island in Lake Kivu, Belgian Congo. The latter is in the general region where Grauer did so much of his collecting and it seems strange that, if the

type was correctly labeled, no second example has been taken at Entebbe where so much collecting has been done by Johnston, Degen, Pitman and others.

Sexual dimorphism. Assuming the type to be a male, then ♂♂ have 237–238 ventrals, and 16–18 subcaudals, and ♀♀ have 254–258 ventrals, and 13 subcaudals, but only two of each sex are known.

Diet. Remains of a blind snake (*Typhlops b. lestradei*) and an egg, possibly a lizard's, were recovered from two Idjwi snakes.

Habitat. If the type locality is correct, then the fact that two of the Idjwi snakes were taken near the lake shore, may indicate a preference of this race for lakeside habitats. The Idjwi male, however, was taken while crossing a path in bush (recently deforested) country at an altitude of about 6000 feet.

Localities. **Belgian Congo:** Idjwi Island in Lake Kivu. **Uganda:** Entebbe.

Range. Western Belgian Congo east to central Uganda.

Genus Aparallactus

1849. *Aparallactus* A. Smith, Ill. Zool. S. Africa, **3**, App. p. 15 (type *capensis* Smith).

1849. *Elapomorphus* A. Smith (not Wiegmann), Ill. Zool. S. Africa, **3**, App. p. 16, footnote (type *capensis* Smith).

1854. *Uriechis* Peters, Monatsb. Akad. Wiss. Berlin, p. 623 (type *lunulatus* Peters).

1859a. *Elapops* Günther, Ann. Mag. Nat. Hist. (3), **4**, p. 161 (type *modestus* Günther).

1860. *Periaspis* Cope, Proc. Acad. Nat. Sci. Philadelphia, pp. 241, 266 (type *plumbeatra* Cope = *modestus* Günther).

1863a. *Cercocalamus* Günther, Ann. Mag. Nat. Hist. (3), **11**, p. 21 (type *collaris* Günther = *capensis* A. Smith).

1923b. *Guyomarchia* Angel, Bull. Mus. Hist. Nat. Paris, **29**, p. 348 (type *unicolor* Angel = *modestus* Günther).

Maxillary short with 5–10 small teeth followed *with or without* an interspace by 1–2 large *grooved or solid* fangs situated below the eye; anterior mandibular teeth longest. Head small, not distinct from neck; eye very small, with round pupil; nasal entire or divided; no loreal; 1, rarely 2, preoculars. Body cylindrical; scales smooth, without pits, in 15 rows; ventrals rounded. Tail moderate or short; subcaudals single.

Range. Africa south of 15° N., i.e. from Portuguese Guinea to Ethiopia.

Remarks. It would appear as if Sir A. Smith, realising that his *Elapomorphus* was preoccupied by that of Wiegmann in Fitzinger (1843 p. 25), sent his description of *Aparallactus* to be inserted by the printers. Whatever the circumstances, however, he published the description of *capensis* twice (p. 15 and p. 16) under different generic names.

The argument for merging *Elapops* with *Aparallactus* was presented by Bogert (1940, p. 43) whose studies of the dentition of *modestus* are responsible for range extensions incorporated in the above description.

Aparallactus hagemanni Gough was long ago removed from this genus by Boulenger (1919a) when he referred it to the synonymy of *Polemon bocourti* Mocquard.

Werner (1925), who was the last to publish a key to the species of this genus, listed 25, here reduced to 12!

In studying the genus it was interesting to note that a block of six western and northern species invariably have seven upper labials of which the third and fourth enter the orbit, while three eastern species (*werneri, turneri* and *nigriceps*) have six labials with the second and third entering; three others (*c. bocagii, c. capensis* and *c. ulugurucnsis*) may present either arrangement though the first appears to be normal.

Synopsis of the Species of Aparallactus

1. A single prefrontal; range French Guinea east to Gold Coast. . . . *lineatus* (p. 183)
   A pair of prefrontals 2
2. First lower labial in contact with its fellow behind the mental 3
   First lower labial not in contact with its fellow behind the mental 9
3. One or two upper labials in contact with a parietal 4
   Upper labials separated from parietal by temporals 7
4. Usually two upper labials (fifth and sixth, rarely fifth only or sixth only) in contact with a parietal; a single temporal (*very* rarely 1 + 1); range Sierra Leone east to Uganda . . . . . *modestus* (p. 186)
   A single upper labial (the fifth) in contact with a parietal; temporals 1+1 5
5. Diameter of eye twice its distance from the mouth; range Togo east to Nigeria . . . . . *liddiardae* (p. 191)
   Diameter of eye less than twice its distance from the mouth 6

6. Preocular usually not in contact with the nasal; range Anglo-Egyptian Sudan (Lado) east to Eritrea south to northern Tanganyika Territory (Arusha) ..... *concolor* (p. 192)

Preocular in contact with the nasal; range Belgian Congo (Dika) and Northern Rhodesia, east to Mozambique (Tete), south to Transvaal... *lunulatus* (p. 195)

7. Upper labials 7, the third and fourth entering the orbit; range dry uplands of southern Ethiopia (east of Lake Rudolf) to southeastern Tanganyika Territory (Rondo Plateau) ..... *jacksonii* (p. 197)

Upper labials 6, the second and third entering the orbit..... 8

8. Ventrals of ♂ and ♀ 141–161; range Tanganyika Territory (montane forests of Magrotto, Usambara and Uluguru)..... *werneri* (p. 199)

Ventrals of ♂ and ♀ 120–139; range Kenya Colony (dry coastal plain between Lamu and Malindi)..... *turneri* (p. 201)

9. Ventrals 168–191; range Angola and South West Africa east through ? southeastern Belgian Congo (Elisabethville) to western ? Mozambique (Chifumbazi) and Transvaal (Kruger Park)..... *c. bocagii* (p. 202)

Ventrals 167 or less..... 10

10. No light and black nuchal collar, uniformly iridescent plumbeous; size larger; range virgin forests of coastal Kenya Colony (Ngatana) and Tanganyika Territory (Magrotto, Usambara, Uluguru Mountains).... *c. uluguruensis* (p. 210)

A black, light-edged nuchal collar; size smaller..... 11

11. Ventrals 134–166; subcaudals 35–59; range savanna of Tanganyika Territory (Ujiji) east to southern Kenya Colony (Mt. Mbololo) south to Pondoland, and west to Angola (Quindumbo)..... *c. capensis* (p. 205)

Ventrals 108–123; subcaudals 20–35; range Mozambique (Inhambane and Tete)..... *nigriceps* (p. 212)

Aparallactus lineatus (Peters)

1870c. *Uriechis* (*Metopophis*) *lineatus* Peters, Monatsb. Akad. Wiss. Berlin, p. 643, pl. i, figs. 3–3c: Keta, Guinea, i.e. Quittah, Gold Coast.

1885d. Müller, p. 678.

1893a. *Uricchis anomala* Boulenger, Ann. Mag. Nat. Hist. (6), **12**, p. 273: Gold Coast. ♂.
1895h. *Aparallactus anomalus* Boulenger, p. 173.
1896d. Boulenger, p. 262, pl. xi, fig. 3.
1919b. Boulenger, p. 293.
1921a. Chabanaud, p. 471.
1921b. Chabanaud, p. 525.
1925. Werner, 1924, p. 158.
1933f. Angel, p. 179.
1895h. *Aparallactus lineatus* Boulenger, p. 173.
1896d. Boulenger, p. 261.
1919b. Boulenger, p. 293.
1925. Werner, 1924, p. 158.
1933f. Angel, p. 178.
1938d. Loveridge, p. 60.
1897a. *Aparallactus niger* Boulenger, Ann. Mag. Nat. Hist. (6), **19**, p. 154: Sierra Leone. ♂.
1919b. Boulenger, p. 293.
1921a. Chabanaud, p. 471.
1921b. Chabanaud, p. 525.
1922. Aylmer, p. 15.
1925. Werner, 1924, p. 158.
1933f. Angel, p. 180.
1908a. *Elapops heterolepis* Mocquard, Bull. Mus. Hist. Nat., **14**, p. 261: Assini, Ivory Coast. ♀.
1925. Werner, 1924, p. 158.
1917. *Rouleophis Chevalieri* Chabanaud, 1916, Bull. Mus. Hist. Nat., **22**, p. 379, figs. 22–23: Sampouyara, French Guinea.
1917b. Chabanaud, p. 12.
1921a. Chabanaud, p. 471.
1933f. Angel, p. 181, figs. 67–67a.

Description. Rostral nearly twice as broad as deep, the portion visible from above one third[1] to half[2] as long as its distance from the frontal; nostril in an entire or semidivided nasal; internasals as long as, or much shorter than, the *single* prefrontal; frontal once and a third to once and two thirds as long as broad (in the middle), as long as, or much longer than, its distance from the end of the snout, much shorter than the parietals, twice as broad as a supraocular; no loreal; preocular 1, in contact with the nasal; eye small, its diameter equal to, or slightly less or greater than, its distance from the mouth; postoculars 1^2 or 2^1, separated from the only temporal 1, flanking the

[1] In type of *niger*.
[2] In type of *chevalieri*.

outer border of the parietal without any enlarged shield below it posteriorly; upper labials 7, the third and fourth entering the orbit, sixth largest, fifth and sixth in contact with a parietal; first lower labial in contact with its fellow behind the mental; 4, rarely 5, lower labials in contact with the anterior sublinguals, which are as long as, or slightly longer than, the posterior. Midbody scales in 15 rows, smooth on females and young males, usually keeled on tail and posterior part of body in adult males; ventrals 151–170; anal entire; subcaudals 33[1]–60.

Based on all original descriptions and literature, also a young striped ♂ (unquestionably *lineatus*) from "Guinea" (M.C.Z. 25826), and two adult plumbeous ♂♂ (undoubtedly *niger*) from Sanoquelle, Liberia (M.C.Z. 43206–7).

Color. Juvenile and Female. Above, olive, with three dark longitudinal lines, each scale of the outer series with a yellow spot. Below, pinkish white minutely speckled with gray.

Adult. Above, uniformly black. Below, and on lips, white, each ventral and subcaudal shield edged with black laterally and posteriorly and with a median black line, or tendency thereto, on tail.

Size. Total length of ♂ (type of *anomalus*), 440 (360 + 80) mm., and total length of ♀ (type of *lineatus*), 440 (383 + 57) mm.

The maximum length of 605 (407 + 198) mm. for *chevalieri* furnished by Chabanaud (1921a) appears to be erroneous, for Angel (1933f) in his redescription of the species, gives only 475 (375 + 100) mm. for an unsexed, but presumably a ♂, specimen.

Remarks. Boulenger (1919a) referred *Rouleophis chevalieri* to the synonymy of *niger*, an action with which Chabanaud (1921a) concurred. Angel (1933f), however, demurred on the grounds that the type of *niger* had 2 postoculars, while the six examples of *chevalieri* possess only 1, and for other reasons, which, after a study of the genus, I consider of even less importance. It is a fact that the type of *niger*, which is the most westerly specimen, remains unique in the possession of 2 postoculars; on the other hand, its nearest ally, *modestus*, displays 1 or 2 indiscriminately throughout its range though in a selected locality one or other condition may be fairly constant.

Angel (1933f) synonymized *Elapops heterolepis* with *anomalus*; later I (1938d) placed all four in the synonymy of *lineatus* for reasons stated there in considerable detail.

Sexual dimorphism. If one assumes the type of *anomalus* to have

[1] It seems possible that 33 and 35 were based on truncated tails, the next lowest subcaudal count is 41.

been a ♀, and not a ♂, then: ♂♂ have 151–164 ventrals, and 58–60 subcaudals, and ♀♀ have 161–170 ventrals, and 33[1] or 41–52 subcaudals.

Localities. **French Guinea:** Beyla; Sampouyara. **Sierra Leone. Liberia:** Sanoquelle (Sanikolé). **Ivory Coast:** Assini.[2] **Gold Coast:** Quittah (Keta).

Range. French Guinea east to Gold Coast.

Aparallactus modestus (Günther)

1859a. • *Elapops modestus* Günther, Ann. Mag. Nat. Hist. (3), **4**, p. 161, pl. iv, fig. C: West Africa.
1860. Cope, p. 566.
1865b. Günther, p. 152.
1875a. Peters, p. 198.
1884a. Rochebrune, p. 151 (ignored).
1891b. Matschie, p. 614.
1893c. Matschie, p. 213.
1896d. Boulenger, pp. 262, 649.
1897b. Mocquard, p. 8.
1897. Sjöstedt, p. 35.
1898. Boettger, p. 112.
1898a. Werner, p. 210.
1899a. Werner, p. 141.
1900b. Boulenger, p. 454.
1903. Gough, p. 468.
1906i. Boulenger, p. 214.
1908a. Sternfeld, pp. 414, 429.
1909a. Sternfeld, p. 22, fig. 34.
1909b. Sternfeld, p. 22, fig. 29.
1910. Müller, p. 615.
1911. Despax, p. 240.
1915a. Boulenger, p. 217.
1919b. Boulenger, p. 293.
1919g. Boulenger, p. 27.
1922. Aylmer, pp. 15, 22.
1923. Schmidt, p. 121, pl. xvii, fig. 2.
1925. Werner, 1924, p. 158.
1927d. Witte, p. 326.
1933f. Angel, p. 183, figs. 68–68a.
1933m. Witte, p. 96.
1934a. Schwetz, p. 381.

[1] It seems possible that 33 and 35 were based on truncated tails, the next lowest subcaudal count is 41.

[2] Given as Assinie, presumably the town on the Ivory Coast side of the border.

1936h. Loveridge, p. 40.
1937c. Loveridge, p. 278.
1937. Pitman, p. 337, pl. xii, fig. 6, col. pl. N, figs. 1–2.
1938a. Pitman, pp. 218, 233.
1938b. Pitman, pp. 188, 190, 316, 331, plates as above (reprint).
1860. *Periaspis plumbeatra* Cope, Proc. Acad. Nat. Sci. Philadelphia, p. 242: Liberia.
1860. *Elapops plumbeater* Cope, p. 566.
1862. *Elapops* (*Calamaria*) *Petersi* Jan, Arch. Zool. Anat. Fisiol., **2**, p. 32: Gold Coast.
1865. Jan, livr. 13, pl. iii, fig. 2.
1885d. Müller, p. 678.
1889. Mocquard, p. 145.
1890b. Müller, p. 692.
1893. Prato, p. 10.
1896. *Aparallactus boulengeri* Werner, Verh. Zool.-Bot. Ges. Wien, **46**, p. 363, pl. vi, figs. 6–6b: Cameroon.
1897. Sjöstedt, p. 35 (as *boulangeri*).
1897b. *Aparallactus peraffinis* Werner, Verh. Zool.-Bot. Ges. Wien, **47**, p. 404, pl. ii, fig. 3: Interior of Cameroon.
1897b. *Aparallactus ubangensis* Boulenger, Ann. Mag. Nat. Hist. (6), **19**, p. 279, fig.: Zongo, Ubangi Rapids, Belgian Congo.
1901g. Boulenger, p. 11, pl. iv, fig. 2.
1903b. Bocage, p. 64.
1915a. Boulenger, p. 217.
1925. Werner, 1924, p. 151.
1901g. *Aparallactus flavitorques* Boulenger, Ann. Musée Congo (1), **2**, p. 11, pl. iv, fig. 3: Lubué, Kasai, Belgian Congo.
1903b. Bocage, p. 64.
1915a. Boulenger, p. 217.
1925. Werner, 1924, p. 151.
1927d. Witte, p. 325.
1933m. Witte, p. 96.
1938b. Pitman, pp. 40, 191.
1902a. *Aparallactus dolloi* Werner, Verh. Zool.-Bot. Ges. Wien, **52**, p. 346: Banzyville, Ubangi River, Belgian Congo.
1915a. Boulenger, p. 216.
1919b. Boulenger, p. 292.
1925. Werner, 1924, p. 157.
1902a. *Aparallactus congicus* Werner, Verh. Zool.-Bot. Ges. Wien, **52**, p. 346: Lingunda, Belgian Congo.
1915a. Boulenger, p. 217.
1925. Werner, 1924, p. 157.
1907c. *Aparallactus Batesii* Boulenger, Ann. Mag. Nat. Hist. (7), **19**, p. 325: 5 miles inland from Kribi, French Cameroon.

1908a. Sternfeld, pp. 414, 429.
1909b. Sternfeld, p. 22.
1919b. Boulenger, p. 292.
1925. Werner, 1924, p. 157.
1910c. *Aparallactus christyi* Boulenger, Ann. Mag. Nat. Hist. (8), **5**, p. 512: Mabira Forest, Chagwe, Uganda.
1915c. Boulenger, p. 634.
1924b. Loveridge, p. 7.
1925. Werner, 1924, p. 158.
1937f. Loveridge, p. 502.
1938b. Pitman, pp. 40, 190, 191.
1939c. Scortecci (part), p. 178 (omit record).
1917. *Aparallactus nigrocollaris* Chabanaud, 1916, Bull. Mus. Hist. Nat. Paris, **22**, p. 377, figs. 18–19: French Congo.
1919b. Boulenger, p. 293.
1925. Werner, 1924, p. 157.
1938a. Pitman, p. 198, pl. xvii, fig. 5, col. pl. W, fig. 6.
1938b. Pitman, p. 296, plates as above (reprint).
1917. *Aparallactus nigrocollaris Roucheti* Chabanaud, 1916, Bull. Mus. Hist. Nat. Paris, **22**, p. 378, figs. 20–21: French Congo.
1919b. *Aparallactus roucheti* Boulenger, p. 293.
1925. Werner, 1924, p. 157.
1923b. *Guyomarchia unicolor* Angel, Bull. Mus. Hist. Nat. Paris, **29**, p. 348, figs. 1–4: French Congo (probably from near Sangha).
1924b. *Aparallactus Graueri* Werner, Sitz. Akad. Wiss. Wien, **133**, p. 42: Beni, Belgian Congo.
1925. Werner, 1924, p. 158.
1940. *Aparallactus modestus* Bogert, p. 43, fig. 5.
1941e. Loveridge, p. 123.
1942e. Loveridge, p. 299.

Further citations of '*modestus*' and '*christyi*' will be found under *concolor*.

Names. Gray Forest Snake (English); *mboli* (Togo); *kileba* (Wamba)

Description. Rostral nearly twice as broad as deep, the portion visible from above half to three quarters as long as its distance from the frontal; nostril in a divided, rarely semidivided, or entire[1] nasal; internasals as long as, or slightly shorter than, the prefrontals; frontal once and a third to once and two thirds[2] as long as broad (in the middle), as long as, or much longer than, its distance from the end of the snout, much shorter than the parietals, twice as broad as a supra-

[1]In types of *boulengeri*, *nigrocollaris* and *roucheti*.
[2]In type of *peraffinis* said to be twice but only two thirds in figure of type.

ocular; no loreal[1]; preocular 1, in contact with, or rarely separated from[2], the nasal; eye small, its diameter equal to, or slightly less or slightly greater than, its distance from the mouth; postoculars 1–2, not in contact with the only temporal; temporal 1, rarely 1 + 1[3], flanking the outer border of the parietal with a smaller enlarged shield below and posterior to it; upper labials 7, the third and fourth entering the orbit, sixth largest, fifth, or fifth and sixth, or sixth[4] only in contact with a parietal; first lower labial in contact with its fellow behind the mental; 4, sometimes 3, lower labials in contact with the anterior sublinguals, which are as long as, or slightly longer than the posterior. Midbody scales in 15 rows, smooth; ventrals 134–164; anal entire; subcaudals 32–51.

Based on the descriptions of all species in the synonymy and literature *after* examination of the entire series in the M.C.Z. The following color description is likewise a composite of adult and young from the original descriptions.

Color. Above, black, brown, yellow brown, olive gray, or blue gray with each scale edged with black, uniform, or a more or less faintly indicated pale, yellow, or black nuchal collar; labials pale or dusky reddish yellow, more or less blotched with black. Below, except for outer (lateral) edges of the ventrals which are colored like the back, orange, yellow, white, gray, or grayish green, uniform or edged with lighter, or with dusky or black flecks and infuscations, particularly on tail which may be entirely gray or black beneath. Eye brown (*fide* Pitman).

Size. Total length of ♂, 457 (377 + 80) mm. from Mabira Forest (Pitman, 1937); total length of ♀ (M.C.Z. 9253), 559 (486 + 73) mm. from Lolodorf. Angel mentions 565 mm. for an unsexed snake.

Remarks. The species *plumbeatra* and *petersi* were synonymized by Gunther (1865b), *boulengeri* and *peraffinis* by their own author (1898, p. 192), Werner, who later (1925) added *unicolor.* Parker (in Pitman, 1937) decided that *flavitorques* and *christyi* were nothing but juvenile *modestus,* for Schmidt (1923) had already pointed out the complete transition from collared juveniles to uniform adults in his series of

[1]Gough (1903) reports a loreal as present on the right side of a West African snake (presumably split off from the posterior nasal).

[2]In type of *nigrocollaris* and in M.C.Z. 38961 (Liberia) and on left side of M.C.Z. 29355 (Cameroon).

[3]See remarks regarding *nigrocollaris* under *Remarks.*

[4]Werner, in describing *graueri,* says third and fourth or fourth and fifth, but this appears to be a *lapsus* for fourth and fifth and fifth and sixth as he has already stated that the third only or third and fourth upper labials enter the orbit in the azygous type which possesses 6 labials on one side, 7 on the other.

nineteen snakes from the Ituri region. The remaining seven species I added to the synonymy in 1942e.

A. nigrocollaris from French Congo was founded on two specimens in which the posterior nasal has fused with the second upper labial, resulting in the second upper labial being in contact with the prefrontal. In *A. n. rouchcti*, with same locality and collector, the arrangement is normal. It seems reasonable to assume that the condition is an aberration for in one of our Liberian specimens (M.C.Z. 38961) the second upper labial is broadly in contact with the prefrontal, while in another Liberian snake (M.C.Z. 38962) it is separated. In one Cameroon reptile (M.C.Z. 9253) the second upper labial is narrowly in contact on the left side only, in yet another (M.C.Z. 29355) it is the third upper labial which is narrowly in contact. In view of Pitman having twice obtained *nigrocollaris* in Uganda, I suggest that the condition may crop up in any part of the range from Liberia to Uganda, for the other point of difference — that of the temporal being subdivided — also occurs on one side of the head in a Uganda snake.

Angel's (1925) reference to *modestus* from Kenya Colony, and that of Loveridge (1929b) quoted by Scortecci (1939c) for a snake taken between Kenya and Ethiopia which was referred to *christyi* are now transferred to *concolor* after reëxamination of both specimens.

Dentition. This has been studied recently by Bogert (1940) as indicated in the generic diagnosis.

Hemipenis. The hemipenis of *modestus* has been described in detail and figured by Bogert (1940).

Sexual dimorphism. Assuming that the Niger specimen mentioned by Boulenger (1896d) and his type of *batesii* were males and not females then ♂♂ have 135–144 ventrals, and 41–51 subcaudals, while ♀♀ have 152–164 ventrals, and 34–44 subcaudals.

Breeding. Without date, at Kribi, a ♀ held 7 eggs measuring about 20 x 5 mm., on November 13, at Mabira Forest, a ♀ held 7 eggs averaging about 25 x 8 mm.

Diet. Nothing known!

Temperament. "Extremely placid and makes no attempt to bite when handled." (Pitman).

Habitat. A forest-dwelling species, taken during clearing operations or in coffee plantations on previously forested areas.

Localities. **Sierra Leone. Liberia.** Harbel. **Gold Coast. Togo:** Adele (Bismarckburg); Grand Popo; Misahöhe; Wegbe. **Nigeria:** Lagos; Niger River. **British Cameroon:** Bonjongo (? Banjo); Buea; Johann Albrechts Heights. **French Cameroon:**

Bipindi; Bitye; Dibongo near Edea; Kribi; Ja River; Lolodorf; Longji; Metet; Mukonje Farm, Mundame; Sakbayeme; Yaunde. **Spanish Guinea:** Esong (as Esosung, Bakossiberge). **French Congo:** Fernand Vaz; Lambarene; Loudinia-Niari, Niari River; ? near Sangha; Sette Kama (Cette Cama). **Belgian Congo:** Avakubi Banzyville; Beni; Kai Bumba; Lingunda; Lubué, Kasai; Lukolela; Makaia Ntete; Medje; Ngombe, Kasai; Saidi; Stanleyville; Temvo; Zongo. **Uganda:** Bisu; Budongo Forest; Bundibugyo; Mabira Forest; [1]Rom Mtn., northeast Acholi; [1]Semliki Valley.

The two **Kenya Colony** records, as mentioned above, were based on misidentified examples of *concolor*.

Range. Equatorial Africa from Sierra Leone east to Uganda.

Aparallactus liddiardae Parker

1908b. *Aparallactus bocagii* Sternfeld (not Boulenger), pp. 219, 234 (Togo).
1909a. Sternfeld, p. 22.
1933. *Aparallactus liddiardae* Parker, Ann. Mag. Nat. Hist. (10), **12**, p. 545: Jos, northern Nigeria.

Description. Rostral broader than deep, the portion visible from above less than half as long as its distance from the frontal; nostril in a divided nasal; internasals shorter than the prefrontals; frontal once and a half as long as broad (in the middle), much longer than its distance from the end of the snout, slightly shorter than the parietals; no loreal; preocular 1, in contact with the nasal; eye small, its diameter equal to twice its distance from the mouth; postocular 1, not in contact with the anterior temporal; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit, fifth in contact with a parietal; first lower labial in contact with its fellow behind the mental; 4 lower labials in contact with anterior sublinguals, which are longer than the posterior. Midbody scales in 15 rows, smooth; ventrals 170 (Togo) to 174 (Nigeria); anal entire; subcaudals 41 (Togo) to 45 (Nigeria).

Based on description of type and data from Sternfeld (1908b).

Color. Above gray, upper surface of the head darker, edges of parietal and temporal shields stippled with black, ocular region and lip below the eye, black; a broad black nuchal collar; the third scale-row on each side and the seven mid-dorsal rows each with a dark spot, the

[1] As *nigrocollaris*.

spots of the middle row largest, and forming a narrow line which is continued forward on to the parietal shields. Below, pale gray.

Size. Total length of type, 80 (44 + 36) mm.

Diet. A relatively large centipede.

Localities. **Togo:** Sausane Mangu. **Northern Nigeria:** Jos.

Range. Togo east to Nigeria.

Aparallactus concolor (Fischer)

1884a. *Uriechis concolor* Fischer, Jahrb. Hamburg. Wiss. Anst., **1**, p. 4, pl. i, fig. 1: Arusha, Tanganyika Territory.
1888b. Günther, p. 325.
1895h. *Aparallactus concolor* Boulenger, p. 172.
1896d. Boulenger, p. 257.
1896e. Boulenger, p. 216.
1896. Tornier, p. 79.
*1896c. Boulenger, p. 21.
1897g. Boulenger, p. 279.
1897. Tornier, p. 65.
*1902b. Mocquard, p. 406.
1907. Lönnberg, p. 16.
1908c. Sternfeld, p. 241.
1909d. Boulenger, p. 311.
1910. Lepri, p. 327.
1910a. Sternfeld, p. 36.
1912. Hobley, p. 53.
1912c. Sternfeld, p. 274.
1913. Lönnberg & Andersson, p. 5.
1915c. Boulenger, p. 634.
1915d. Boulenger, p. 655.
1916a. Loveridge (part), p. 86.
1923b. Calabresi, p. 162.
1924b. Loveridge, p. 7.
1925. Werner, 1924, p. 157.
1927. Calabresi, pp. 33, 56.
1929h. Loveridge, p. 34.
1934c. Scortecci, p. 74, fig. 32.
1936j. Loveridge, p. 269.
*1936e. Parker, p. 608.
1937f. Loveridge, pp, 493, 496.
1937. Pitman, p. 335, pl. xii, fig. 5, col. pl. M, fig. 5.
1938a. Pitman, p. 217.
1938b. Pitman, pp. 40, 188, 315, plates as above (reprint).

*1939a. Scortecci, p. 285.
1939c. Scortecci, p. 175 (as *A. c. concolor*).
1940a. Scortecci, p. 136.
?1896a. *Aparallactus lunulatus* Boulenger (not Peters), p. 554.
?1928b. Scortecci, p. 306.
1925a. *Elapops modestus* Angel (not Günther), p. 36.
*1929h. *Aparallactus christyi* Loveridge (not Boulenger), p. 34.
*1939c. Scortecci (part), p. 178.
*1931c. *Aparallactus concolor boulengeri* Scortecci, Atti. Soc. Ital., **70**, p. 212: Villaggio Duca Abruzzi and inland from Mogadiscio, Italian Somaliland.
*1934c. Scortecci, p. 75.
*1939c. Scortecci, p. 177, figs. 99–100.

Names. Plumbeous Centipede-eater (English); *mowa* (Teita, but generic).

Description. Rostral nearly twice as broad as deep, the portion visible from above half to two thirds as long as, or even equal to, its distance from the frontal; nostril in a divided, semidivided, or entire nasal (which is fused with a labial on one side of the head in the cotype ♀ of *boulengeri*); internasals much shorter than the prefrontals; frontal once and a half to twice as long as broad (in the middle), much longer than its distance from the end of the snout, as long as, or slightly shorter than, the parietals; once and two thirds to twice as broad as a supraocular; no loreal; preocular 1, not, or but rarely[1], in contact with the nasal; eye small, its diameter equal to, or greater than, its distance from the mouth; postocular 1, not in contact with the anterior temporal; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit, fifth largest and in contact with a parietal; first lower labial in contact with its fellow behind the mental; 4 lower labials in contact with the anterior sublinguals, which are about as long as the posterior. Midbody scales in 15 rows, smooth; ventrals 140[2]–173[3]; anal entire; subcaudals 43–77.

Based on original descriptions, literature, and Kenya material in the M.C.Z. and U.S.N.M.

*Some or all of these specimens have the preocular in contact with the nasal a character of *boulengeri* which may yet prove to be a recoguizable race, though the name is preoccupied by *boulengeri* Werner, 1896.

[1] In Athi Plains specimen (Mocquard) and Kenya-Ethiopian frontier snake (Loveridge), types of *boulengeri*, etc.

[2] In "*lunulatus*" from Let Marefia; Calabresi's record of 133 is rejected.

[3] In "*lunulatus*" from Isole; if these two are not *concolor* then the range is 143–169.

Color. Above, uniformly plumbeous. Below, rather paler, sometimes almost white. (♂ and ♀ adults. Tanganyika and Kenya. Loveridge).

Above, uniformly brown with a light purplish reflection. Below, slightly lighter, (adult. Mogadish, Italian Somaliland. Lepri, 1910).

Above, rather pale yellowish, a large transverse black band on hinder part of head and nape, each dorsal scale edged with brown. Below, uniformly whitish yellow. (♂ ♀ adults. Durgale to Magghiole, Italian Somaliland. Calabresi, 1927).

Above, pale maroon, a four-scale wide transverse black band on hinder part of head and nape, pre- and postocular and third or third and fourth labials black. Below, very pale rosy yellowish. (Neghelli, Ethiopia. Scortecci, 1940a).

Size. Total length of type, ?♂, 360+ (300 + 60+) mm. from Arusha; and total length of ♀ (M.C.Z. 40711), 520 (420 + 100) mm. from Voi.

Remarks. Werner's (1908) reference to *concolor* in the Sudan appears to have been based on a misidentification, possibly of a *Prosymna.* The snake from Kitui, identified by Boulenger, and listed by Loveridge (1916a) is evidently something else.

Parker (1936e) synonymized *boulengeri* with *concolor* the same year that I (1936j) placed it in the synonymy of *uluguruensis!* Actually it is intermediate between the two, agreeing with *concolor* in the first lower labial being in contact with its fellow, but agreeing with *uluguruensis* in having the preocular in contact with the nasal. Of these characters that of the lower labials is more constant and important in the genus so I admit that I was wrong in my disposition of *boulengeri.*

I am inclined to think — on account of the extensive range in variation in ventral and subcaudal counts — that we really are dealing with two forms and that a race — for which the name *boulengeri* is not available — does occur in Italian Somaliland. The question can only be decided by someone assembling all the *concolor* material, sexing it, and seeing whether there is any discernible geographical significance or correlation between higher scale counts and naso-preocular contact. The data at my disposal does not reflect it, but perhaps authors have referred to *concolor,* without comment, snakes that might have been assigned to *"boulengeri".*

There is an undoubted tendency in northern Kenya and southern Somaliland for the preocular to be in contact with the nasal. In the northern part of its range, *concolor* certainly exhibits a wider variation in the number of ventrals, which do not go above 158 in the south. The coloration in that region also appears to be uniformly plumbeous,

thereby differing from many specimens described from Somaliland and Eritrea.

Diet. A centipede, about as long as a finger and nearly the same diameter as the snake itself, in Kenya (Sternfeld).

Localities. **Anglo-Egyptian Sudan:** Lado. **Eritrea:** Isole[1] near Massaua. **Ethiopia:** Between Ethiopia and Kenya; between Gara Mulata and Lake Haramaya; Let Marefia[3], Shoa; Neghelli. **Italian Somaliland:** Balad; Bardera; Belet Amin; Durgale to Magghiole; Kismayu; between Lugh and Matagoi; Mofi; Mogadish; between Obbia and Tobungab; Villa Duca de Abruzzi. **Kenya Colony:** Athi Plains; Boran country; Bulessa; Bura; Lamu Island; Lodwar; Mount Mbololo; Mtito Andei; east of Tsavo (Izavo); Turkana; Voi. **Tanganyika Territory:** Arusha; Usambara.

Range. Anglo-Egyptian Sudan east to Eritrea and south to extreme northern Tanganyika Territory.

Aparallactus lunulatus (Peters)

1854. *Uriechis lunulatus* Peters, Monatsb. Akad. Wiss. Berlin, p. 623: Tete, Mozambique.
1855. Peters, p. 53.
1882a. Peters, p. 113, pl. xviii, fig. 2.
1888b. Günther, p. 324.
1891a. Boulenger, p. 308.
1896a. Bocage, p. 100.
1895h. *Aparallactus lunulatus* Boulenger, p. 172.
1896d. Boulenger, p. 258.
1907a. Boulenger, p. 12.
1910a. Sternfeld, p. 36.
1915a. Boulenger, p. 216.
1915c. Boulenger, p. 634.
1917. Sternfeld, p. 481.
1924b. Loveridge, p. 7.
1925. Werner, 1924, p. 158.
1928d. Loveridge, p. 57.
1933m. Witte, p. 96.
1934. Pitman, p. 298.
1937f. Loveridge, p. 496.
1937b. Mertens, p. 14.

Further citations of *'lunulatus'* will be found under *concolor* and *c. bocagii.*

[1] Recorded as *lunulatus* by Boulenger and Scortecci respectively, have not been reëxamined.

Names. Blotched-back Centipede-eater (English); *bubse* (Tete).

Description. Rostral nearly twice as broad as deep, the portion visible from above one third to half as long as its distance from the frontal; nostril in a divided or entire[1] nasal; internasals much shorter than the prefrontals; frontal once and a half to once and two thirds as long as broad (in the middle), much longer than its distance from the end of the snout, as long as, or slightly shorter than, the parietals; once and two thirds to twice as broad as a supraocular; no loreal; preocular 1, in contact with the nasal; eye small, its diameter equal to, or greater than, its distance from the mouth; postocular 1, not in contact with the anterior temporal; temporals 1+1; upper labials 7, the third and fourth entering the orbit, fifth largest and in contact with a parietal; first lower labial in contact with its fellow behind the mental; 4, sometimes 3[2], lower labials in contact with the anterior sublinguals, which are about as long as, or shorter than, the posterior. Midbody scales in 15 rows, smooth; ventrals 151–167[3]; anal entire; subcaudals 48–58.

Based on original description, literature, and two specimens in the Museum of Comparative Zoölogy.

Color. Composite. Above, olive, olive gray, or olive green, dark or light brown, uniform or with a light yellow collar preceding a black transverse band which may be followed by a series of black bars or spots; a black fleck below the eye; each scale of back edged with darker. Below, white or greenish yellow.

Size. Total length of ♂ (M.C.Z. 23075), 288 (232 + 56) mm. from Mukwese, being surpassed by the unsexed type, measuring 415 (325 + 90) mm., and a 485 (385 + 100) mm. specimen from Punda Maria, Transvaal.

Remarks. The records of Boulenger (1896a) and Scortecci (1928b, repeated 1939c), and listing of Zavattari (1930b) of two "*lunulatus*" from Ethiopia and Eritrea respectively, have been transferred arbitrarily to *concolor*. This has been done not merely because *lunulatus* is otherwise unknown north of Tanganyika, but because the scale counts of both and color (of the one furnished) approximate more nearly to those of *concolor*, with which species they appear to have been identified on the basis of Boulenger's (1896d) key which fails to distinguish *concolor* as now understood.

[1] Entire in Victoria Falls specimen (M.C.Z. 21481).

[2] Three in Victoria Falls and Mukwese specimens in M. C. Z. Perhaps these are aberrant *c. capensis*, and the type and Boulenger's two snakes, which had four, represent true *lunulatus* which would then agree with its preceding allies in this character.

[3] 167 in a Punda Maria, Transvaal, snake (FitzSimon's letter of 18, vii, 1941), otherwise 161.

Indeed it seems highly probable that the eleven recorded, and widely scattered specimens of *lunulatus* may prove to be only aberrant *c. capensis* in which the first lower labials are in contact behind the mental — throwbacks to their ancestral condition. This appears to be the only difference between the two if one excepts the strange coloring of the type, for subsequent specimens appear to be colored like *c. capensis*. In this connection it may be noted also that Peters himself recorded both species from Tete, and both occur at Victoria Falls.

Localities. **Belgian Congo:** Dika. **Tanganyika Territory:** Duma; Lake Tanganyika; Mukwese near Manyoni; Rufigi River; **Mozambique:** Cheringoma Farm, Inhaminga; Tete. **Nyasaland:** Lake Nyasa. **Northern Rhodesia:** Ulungu Mountain west of Luangwa River; Victoria Falls. **Transvaal:** Punda Maria.[1]

Range. Belgian Congo and Northern Rhodesia east to Mozambique, south to Transvaal.

Aparallactus jacksonii (Günther)

1888b. *Uriechis Jacksonii* Günther, Ann. Mag. Nat. Hist. (6), **1**, p. 325, pl xix, fig. E: Foot of Mount Kilimanjaro, Tanganyika Territory.
1895h. *Aparallactus jacksonii* Boulenger, p. 172.
1896d. Boulenger, pp. 256, 649.
1896. Tornier, p. 79.
1898a. Boulenger, p. 721.
1897. Tornier, p. 65.
1907. Lönnberg, p. 16.
1910a. Sternfeld, p. 35.
1912. Hobley, p. 53.
1915c. Boulenger, p. 633.
1916a. Loveridge, p. 86.
1916b. Loveridge, p. 122.
1918a. Loveridge, p. 325.
1923e. Loveridge, p. 889.
1924b. Loveridge, p. 7.
1925. Werner, 1924, p. 157.
1928g. Loveridge, p. 41.
1929h. Loveridge, p. 34.
1936. Roux, p. 178.
1937f. Loveridge, p. 496.
1937d. Mertens, p. 8.
1939c. Scortecci, p. 174.
1942e. Loveridge, p. 300.

Further citation of '*jacksonii*' will be found under *turneri*.

[1] 67 in a Punda Maria, Transvaal, snake (FitzSimon's letter of 18, vii, 1941), otherwise 161.

Names. Jackson's Centipede-eater (English).

Description. Rostral nearly twice as broad as deep, the portion visible from above one third to half as long as its distance from the frontal; nostril in a semidivided or entire nasal; internasals much shorter than the prefrontals; frontal once and a half to once and two thirds as long as broad (in the middle), much longer than its distance from the end of the snout, as long as, or slightly shorter than, the parietals, once and a half to twice as broad as a supraocular; no loreal; preocular 1, in contact with the nasal; eye small, its diameter equal to, or greater than, its distance from the mouth; postoculars 2, in contact with the anterior temporal; temporals 1 + 1; upper labials 7, the third and fourth entering the orbit, sixth largest but *not* in contact with a parietal; first lower labial in contact with, very rarely separated from[1], its fellow behind the mental; 3 lower labials in contact with the anterior sublinguals, which are about as long as, or slightly longer than, the posterior. Midbody scales in 15 rows, smooth; ventrals 134–157; anal entire; subcaudals 33–46.

Based on original description, literature, and eight specimens.

Color. Above, head black, a six-scale wide transverse black band, edged before and behind by scale-wide bands of bright yellow, on nape; back and tail a delicate pinkish brown (in life) or terra cotta with, or without, a fine black vertebral line, more rarely a lateral series of white scales bordered with black above and below, which, if confluent, would form lateral lines. Below, bright yellow (in life) or white.

Size. Total length of ♂, 276 (228 + 48) mm. from foot of Mount Longido; total length of ♀ (M.C.Z. 48442), 259 (213 + 46) mm. from Nchingidi.

Sexual dimorphism. ♂♂ have 134–144 ventrals, and 35–46 subcaudals. ♀ ♀ have 148–157 ventrals, and 33–44 subcaudals.

Temperament. Inoffensive, not attempting to bite.

Habitat. This species favours the hot upland steppe with scattered acacia forest where, during the rains, I collected half-a-dozen beneath boulders, stones and logs in the centipede-infested region at the western foot of Mount Longido.

Elsewhere[2] I have recounted how one of these snakes attempted to cross the face of a recumbent trooper encamped at the foot of Mount Meru, and was subsequently captured beneath his blankets.

Localities. **Ethiopia:** Between Dime (? Dima) and Lake Ru-

[1] Separated in one of a series of six Longido snakes (U.S.N.M. 62919).

[2] Fauna (Philadelphia), 4, p. 119. December, 1942.

dolf. **Kenya Colony:** Kell's Farm near Nairobi; Lamu Island[1] (!); Lat. 0°0, Long. 39E.; Naivasha; "Uganda".[2] **Tanganyika Territory:** foot of Mt. Kilimanjaro; foot of Mt. Longido; Matete Bach; foot of Mt. Meru near Ngare Mtoni; Nchingidi, Rondo Plateau; Ngare na Nyuki; Tanga (!).

Range. Dry uplands from southern Ethiopia to southeastern Tanganyika Territory.

Aparallactus werneri Boulenger

1895h. *Aparallactus Werneri* Boulenger, Ann. Mag. Nat. Hist. (6), **16**, p. 172 : Usambara Mountains, Tanganyika Territory.
1896d. Boulenger, p. 257.
1896. Tornier, p. 79.
1897c. Mocquard, p. 123.
1897. Tornier, p. 65.
1898. Boettger, p. 111.
1910a. Sternfeld, p. 35, fig. 41.
1911b. Nieden, p. 442.
1915c. Boulenger, p. 633.
1923e. Loveridge, p. 889.
1924b. Loveridge, p. 7.
1925. Werner, 1924, p. 157.
1926. Werner, p. 248.
1928c. Barbour & Loveridge, p. 131.
1928g. Loveridge, p. 41.
1937f. Loveridge, p. 502.
1942e. Loveridge, p. 301.

Names. Werner's Centipede-eater (English); *nyoka usambia* (Shambaa, but applied by them to *Neusterophis o. uluguruensis* also).

Description. Rostral nearly twice as broad as deep, the portion visible from above half to two thirds as long as its distance from the frontal; nostril in an entire (or semidivided[3]) nasal; internasals shorter than, or equal to, the prefrontals; frontal once and a third to once and two thirds as long as broad (in the middle), much longer than its distance from the end of the snout, as long as, or slightly shorter than, the parietals; once and two thirds to twice as broad as a supraocular; no loreal; preocular 1, in contact with the nasal; eye small, its diameter

[1] Sternfeld's (1910a) record, more probably an *A. turneri*.

[2] Boulenger's (1896d, p. 649) record, for "Uganda" on this page read Kenya Colony.

[3] *Fide* Tornier, but entire in all our fifty snakes.

equal to, or greater than, its distance from the mouth; postoculars 2, very rarely 1[1], in contact with the anterior temporal; temporals 1 + 1; upper labials 6, the second and third entering the orbit, fifth largest but *not* in contact with a parietal; first lower labial not, or but very rarely[2], in contact with its fellow behind the mental; 3 lower labials in contact with the anterior sublinguals, which are about as long as, or slightly longer than, the posterior. Midbody scales in 15 rows, smooth; ventrals 141–161; anal entire; subcaudals 32–45.

Based on original description, literature, and over fifty specimens in the Museum of Comparative Zoölogy.

Color. Above, head black, a six-scale wide transverse black band, edged before, and sometimes behind, by scale-wide bands of olive or yellow, on nape; back and tail usually olive, rarely pale brown. Below, throat whitish tinged with yellow, rest of undersurface bright lemon yellow.

Size. Total length of a cotype, 390 (325 + 65) mm. from Usambara Mountains, and total length of a ♀ (M.C.Z.), 354 (295 + 59) mm. from Amani.

Sexual dimorphism. Most unfortunately, in 1928, I included two young males in a series of thirty-three females, thus masking the dimorphism in ventral counts. I have carefully rechecked all extremes of the series of fifty specimens now available and find that ♂♂ have 141–151 ventrals, and 35–45 subcaudals, while ♀♀ have 154–161[3] ventrals, and 32–42 subcaudals.

Breeding. In November, at Amani, 17 out of 31 females held large well-developed, very elongated eggs, the largest (on 25.xi.26) measuring 39 x 6 mm. Seven snakes held 2 eggs, eight had 3 eggs, and two had 4 eggs.

Diet. Centipedes in each of four snakes.

Enemies. One was recovered from the stomach of a *Calamelaps u. unicolor.*

Habitat. I found these snakes beneath logs, bark and stones, both within and without the rain forest but chiefly along its edge. Some were unearthed by hoeing up grass and weeds on the outskirts of the forest. In fact its habitat is very similar to that of the North American ring-necked snakes (*Diadophis* spp.) which it so closely resembles in color, markings and size. A montane species.

[1] In only one of a series of fifty snakes.

[2] On one side only in two out of fifty snakes.

[3] Not 163 as given in Barbour & Loveridge, 1928c, p. 131, recounted as 161.

Localities. **Tanganyika Territory:** Amani; Baglio; Bumbuli; Kizerui; Kukulio; Magrotto; Mkarazi; Mt. Lutindi; Nguelo; Tanga; Vituri.

These places, with the exception of Tanga, are all in one or other of the four mountains — Magrotto, Pare, Uluguru, Usambara. Mocquard (1897c) is responsible for the Tanga record, Tanga is the port for Usambara which is about forty miles away, and pending confirmation this record for Tanga should be accepted with reserve.

Range. Mountains of eastern Tanganyika Territory.

Aparallactus turneri Loveridge

?1910a. *Aparallactus Jacksoni* Sternfeld (part, not Günther), p. 35.
1935c. *Aparallactus turneri* Loveridge, Bull. Mus. Comp. Zoöl., **79**, p. 9: Sokoki Forest, near Malindi, Kenya Colony.
1936j. Loveridge, p. 268.
1937f. Loveridge, p. 493.

Description. Rostral nearly twice as broad as deep, the portion visible from above one third to two thirds as long as its distance from the frontal; nostril in an entire nasal; internasals much shorter than the prefrontals; frontal once and a half to once and two thirds as long as broad (in the middle), longer than its distance from the end of the snout, as long as the parietals; once and two thirds to twice as broad as a supraocular; no loreal; preocular 1, in contact with the nasal; eye small, its diameter greater than its distance from the mouth; postoculars 2, rarely 1, in contact with the anterior temporal; temporals 1 + 1; upper labials 6, the second and third entering the orbit, fifth largest but *not* in contact with a parietal; first lower labial in contact with its fellow behind the mental; 3 lower labials in contact with the anterior sublinguals, which are about as long as the posterior. Mid-body scales in 15 rows, smooth; ventrals 120–139; anal entire: subcaudals 31–42.

Based on the type series of four males and two females.

Color. Above, head black with white blotches, one anterior, one posterior, to the eye, the second blotch larger and extending upwards on to the anterior temporal; a black transverse band, sometimes edged before and behind by scale-wide light bands (which may break up into spots), on the nape, the anterior, being just posterior to the parietals, tends to separate the black of the head from the black of the nape; back and tail a pallid, pinkish brown, the edges of each scale darker,

and with, or without, a fine black vertebral line. Below, white, uniform except for a slight encroachment of the black nape patch in two downward-pointing patches.

Size. Total length of ♂, 202 (167 + 35) mm. from Peccatoni; total length of ♀, 196 (165 + 31) mm. from near Witu.

Sexual dimorphism. ♂♂ have 120–129 ventrals, and 33–42 subcaudals. ♀♀ have 134–139 ventrals, and 31–37 subcaudals.

Habitat. Beneath logs and stones on the sandy coastal plain.

Localities. **Kenya Colony:** ? Lamu Island[1]; Mkonumbi; near Witu; Peccatoni; Sokoki Forest.

Range. Kenya Colony coast between Lamu and Malindi.

Aparallactus capensis bocagii Boulenger

1895a. *Uriechis capensis* Bocage (part, not Smith), p. 127: Gambos; Novo Redondo; and Quindumbo, Angola.
1895h *Aparallactus guentheri* Boulenger (part), p. 172: Angola only.
1895h. *Aparallactus bocagii* Boulenger, Ann. Mag. Nat. Hist. (6), **16**, p. 173: Angola.
1896d. Boulenger, p. 259.
1905c. Boulenger, p. 114.
1915a. Boulenger, p. 216.
1925. Werner, 1924, p. 158.
1933f. Angel (part), p. 179 (omit Togo from range).
1937b. Monard, p. 129.
1897a. *Uriechis Guentherii* Bocage, p. 201.
1897a. *Uriechis Bocagi* Bocage, p. 201.
?1908c. *Aparallactus lunulatus* Sternfeld (not Peters), p. 247.
1910c. *Aparallactus Lubberti* Sternfeld, Mitt. Zool. Mus. Berlin, **5**, p. 57: Between Omaruru and Okanjanda (?Okahandja), South West Africa.
1910b. Sternfeld, p. 30, fig. 35.
1925. Werner, 1924, p. 157 (as *luebberti*).
?1933m. *Aparallactus punctatolineatus* Witte, p. 96.
?1937b. *Aparallactus nigriceps* Mertens (not Peters), p. 14.

Further citation of '*bocagii*' will be found under *lidiardae*.

Names. Angolan Centipede-eater (English).

Description. Rostral nearly twice as broad as deep, the portion visible from above one third to two thirds as long as its distance from

[1] It seems probable that Sternfeld's (1910a) specimen of "*jacksonii*" from Lamu should be referred to *turneri* which occurs on the opposite mainland at Mkonumbi.

the frontal; nostril in an entire or divided[2] nasal; internasals much shorter than the prefrontals; frontal once and a half to once and two thirds as long as broad (in the middle), much longer than its distance from the end of the snout, as long as, or slightly shorter than, the parietals; once and two thirds to twice as broad as a supraocular; no loreal; preocular 1, in contact with, rarely separated from[1], the nasal; eye small, its diameter equal to, or greater than, its distance from the mouth; postocular 1, not in contact with the anterior temporal; temporals 1 + 1, rarely 0 + 1; upper labials 7, rarely 6[2], the third and fourth, rarely second and third[2], entering the orbit, fifth, rarely fourth, largest, and fifth, or fourth and fifth in contact with a parietal; first lower labial not in contact with its fellow behind the mental; 3 lower labials in contact with the anterior sublinguals, which are as long as, or slightly longer than, the posterior. Midbody scales in 15 rows, smooth; ventrals[3] 168–191; anal entire[4]; subcaudals 35[5] or 44–59.

The *above description*, being based on literature only, *should be received with reserve* and is subject to correction.

Color. Above, head black with white blotches, one anterior, one posterior, to the eye, the second blotch larger and extending upwards to the anterior temporal; a black transverse band, edged anteriorly with yellow, on nape; back and tail reddish brown, a small brown spot in the centre of each scale, the spots forming longitudinal lines. Below, white.

Size. Total length of type, 272 mm. from Gambos, of a ♀, 330 (285 + 45) mm. from between Benguela and Bihe.

Remarks. Bocage (1895a), in addition to a true *capensis* from Bibala (if the ventral count of 161 is correct, in which case it is the only example from the West with so low a count), had two snakes with entire nasals from Gambos and Novo Redondo. Without seeing them, Boulenger (1895h) made these the cotypes of a new species — *bocagii*, of which he had no material in the British Museum. Bocage, however, had also listed a specimen from Quindumbo with a divided nasal, on account of this character, Boulenger added its high ventral count (180) to that of his new species *guentheri* and added Angola to the range of *guentheri*. I regard *guentheri* as a synonym of *c. capensis*, a species which, though normally possessing an entire nasal, produces

[1] Not in contact in Sternfeld's two Chifumbazi specimens of *lunulatus*.

[2] In type of *lubberti*, and others.

[3] Said to be 161 in a snake from Bibala, *fide* Bocage.

[4] Bocage has corrected his (1895a) misstatement about divided anals and paired subcaudals.

[5] In the Benguela to Bihe specimen which I suggest has a mutilated tail.

individuals here and there in the east in which it is divided. In this connection it is interesting to note that such cases appear rare indeed in the southeast for FitzSimons writes me that the nasal is entire in all 32 examples of *c. capensis* and 7 (of what I should call) *bocagii* in the collection of the Transvaal Museum.

Since its description in 1895, only one specimen of *bocagii* has been recorded (Boulenger, 1905c) as such, for I reject Sternfeld's (1908b, p. 219) record of its occurrence in Togo, a statement apparently based on a misidentified specimen of the recently-described *liddiardae*.

Later, however, Sternfeld (1910c) described *lübberti*, differing only from *bocagii* in having a divided nasal and six upper labials, of which the second and third (left), or third (right) only enter the orbit, consequently the fourth (instead of the fifth) upper labial is largest and in contact with the parietal. This reduction in labials is a variation common to four species of the genus at least.

I am less confident in suggesting that Sternfeld's (1908c) *lunulatus* material with 168–172 ventrals is referable to *bocagii*, much turns on the stability of the character involving the forming of a suture by the first pair of lower labials. The snake requires reëxamination.

Witte (1933m) has recorded a snake from the southern Belgian Congo under the name of *punctatolineatus*, but gives no scale counts. On geographical grounds I tentatively refer it to *bocagii* for, if its second and third labials enter the orbit, as one may justifiably assume, then it would naturally run down to *punctatolineatus* in Boulenger's key.

The snake that Mertens (1937b) refers to *nigriceps* has a similar labial condition but its high ventral count (178) precludes its reference to *nigriceps* (108–123) or *capensis* (131–166) though the record involves extension of the range of *bocagii* south to the Transvaal. On appealing to Mr. V. FitzSimons for light on this point he, with customary kindness, furnished me with scale counts of all "*capensis*" in the Transvaal Museum. These show that what I regard as *bocagii*, i.e. snakes with 169–180 ventrals, occurs sparsely throughout the Transvaal, both *bocagii* and *c. capensis* occurring together at Lydenburg, Pretoria, and Johannesburg. Were we to assume that snakes from these three places were all of one form we would be confronted with the absurdly large ventral range of 138–180 for so small a snake. Personally I feel that *bocagii* is little more than a race of *c. capensis*, such treatment, however, would involve regarding almost the entire Transvaal as an area of intergrades, at the present stage of our knowledge, therefore, it seems advisable to treat them as subspecies.

Localities. ?**Belgian Congo:** Elisabethville. **Angola:** Benguela to Bihe; Bibala[1]; Bingondo; Gambos; Novo Redondo; Quindumbo. **South West Africa:** Okanjande to Omaruru. **Transvaal:** Gravelotte; Johannesburg[2]; Lydenburg[2]; Malelane Camp, Crocodile River, Kruger National Park; Pretoria[2]; Vaalwater. **Mozambique:** Chifumbazi.

Range. Angola and South West Africa, east through southeastern Belgian Congo to *extreme* western Mozambique, south through the Transvaal where it occurs alongside *c. capensis* in several localities.

Aparallactus capensis capensis Smith

1849. *Aparallactus capensis* A. Smith, Ill. Zool. S. Africa, **3**, App., p. 16: Kaffirland to the eastward of Cape Colony.
1895h. Boulenger, p. 173.
1896d. Boulenger, p. 259.
1896. Tornier, p. 79.
1898. Sclater, p. 100.
1898. Werner, 1896–7, p. 146.
1902b. Boulenger, p. 18.
1907j. Boulenger, p. 487.
1907a. Roux, p. 81.
1908b. Boulenger, p. 230.
1908. Gough, p. 33.
1908. Odhner, p. 5 (? part, *nigriceps*).
1909a. Chubb, p. 596.
1909b. Chubb, p. 36.
1910b. Boulenger, p. 516.
1910a. Sternfeld, p. 36.
1912. FitzSimons, F. W., p. 128.
1913. Hewitt & Power, p. 164.
1915a. Boulenger, p. 216.
1915c. Boulenger, p. 634.
1923e. Loveridge, p. 889.
1924b. Loveridge, p. 7.
1925. Werner, 1924, p. 158.
1934. Pitman, p. 298.
1935b. FitzSimons, V., p. 323.
1936j. Loveridge, p. 268.
1937a. FitzSimons, V., p. 263.
1937f. Loveridge, p. 496.

[1] But said to have 161 ventrals.

[2] Where it occurs alongside *c. capensis.*

1937a. Parker, p. 630.
1937e. Hewitt, p. 64, pl. xviii, fig. 1.
1937. Uthmöller, p. 123.
1939b. FitzSimons, V., p. 24.
1940. Bogert, p. 43.
1941. Moreau & Pakenham, p. 109.
1849. *Elapomorphus capensis* A. Smith, Ill. Zool. S. Africa, **3**, App., p. 16: Kaffirland to the eastward of Cape Colony.
1863a. *Cercocalamus collaris* Günther, Ann. Mag. Nat. Hist. (3), **11**, p. 21, pl. iii, fig. A: "Central America" (in error).
1895. Günther, Biol. Centrali Americana, Rept., p. 157.
1865a. *Uriechis capensis* Günther, p. 89.
1866. Jan, livr. 15, pl. i, fig. 5.
1882a. Bocage, p. 288.
1882a. Peters, p. 112.
1884a. Rochebrune, p. 154 (ignored).
1887h. Boulenger, p. 175.
1888b. Günther, p. 324.
1889. Boettger, p. 293.
1891a. Boulenger, p. 308.
1891a. Matschie, p. 609.
1892. Müller, p. 207.
1893. Günther, 1892, p. 555.
1895a. Bocage, p. 127.
1896a. Bocage, p. 94.
1898. Johnston, p. 361a.
1895h. *Aparallactus guentheri* Boulenger (part), Ann. Mag. Nat. Hist. (6), **16**, p. 172: East and Central Africa (exclude Angola).
1896d. Boulenger (part), p. 259, pl. xi, fig. 2.
1902b. Boulenger, p. 18.
1910b. Boulenger, p. 516.
1910a. Sternfeld, p. 36.
1912. FitzSimons, F. W. (part), p. 128.
1915a. Boulenger (part), p. 216.
1915c. Boulenger (part), p. 634.
1924b. Loveridge, p. 7.
1925. Werner (part), 1924, p. 158.
1934. Pitman, p. 298.
1937f. Loveridge, p. 496.
1937b. Monard (part), p. 129.
1941. Moreau & Pakenham, p. 109.
1895h. *Aparallactus punctatolineatus* Boulenger, Ann. Mag. Nat. Hist. (6), **16**, p. 173: Angola.
1896d. Boulenger, p. 261.
1897a. Bocage, p. 201.

1915a. Boulenger, p. 217.
1915c. Boulenger, p. 634.
1925. Werner, 1924, p. 158.
1934. Pitman, p. 298.
1895h. *Aparallactus nigriceps* Boulenger (part, not Peters), p. 173.
1896d. Boulenger (part), p. 260.
1896. Tornier, p. 79.
1897. Tornier, p. 65.
1910a. Sternfeld, p. 36.
1915c. Boulenger (part), p. 634.
1924b. Loveridge, p. 7.
1924. Werner (part), 1924, p. 158.
1897a. *Uriechis punctatolineatus* Bocage, p. 201.

Further citations of '*capensis*', '*guentheri*', and '*punctatolineatus*' will be found under *c. bocagii*.

Names. Cape Centipede-eater or Black-headed Snake (English); *yamitera* (Makonde: Tanganyika).

Description. Rostral nearly twice as broad as deep, the portion visible from above one third to two thirds as long as its distance from the frontal; nostril in an entire, semidivided, or divided nasal; internasals shorter than the prefrontals; frontal once and a half to once and two thirds as long as broad (in the middle), much longer than its distance from the end of the snout, as long as, or slightly shorter than, the parietals, once and two thirds to twice as broad as a supraocular; no loreal; preocular 1, in contact with the nasal; eye small, its diameter equal to, or greater than, its distance from the mouth; postocular 1, not, or but very rarely[1], in contact with the anterior temporal; temporals 1 + 1; upper labials 7, sometimes 6, the third and fourth, or sometimes the second and third, entering the orbit, fifth largest and in contact with, very rarely separated from[2], a parietal; first lower labial *not* in contact (unless *lunulatus* is a synonym) with its fellow behind the mental; 3 lower labials in contact with the anterior sublinguals, which are as long as, or slightly longer than, the posterior. Midbody scales in 15 rows, smooth; ventrals 131–167; anal entire; subcaudals 34–59[3].

Based on original descriptions, literature, data of those in Transvaal Museum, and many Kenya, Tanganyika, Mozambique and Transvaal specimens in the M.C.Z.

[1] On right side only of a Lumbo snake (M.C.Z. 16364).

[2] On right side only of a Lumbo snake (M.C.Z. 16364).

[3] Or 63 if one includes a snake from Ingwavuma, Zululand (T.M. 15315) with 154 ventrals, these counts checked by FitzSimons who has another Zululand specimen (from Ntambanana) with 133 ventrals and 50 subcaudals.

Color. Two principal color phases exist, one, which is intermediate between the uniformly plumbeous, sylvicoline *c. ulugurensis* and the pale brown, savanna and coastlands *c. capensis,* occurs in deforested or adjacent areas and is likely to present so many stages that it is unworthy of recognition by name. The following description is based on a pair, which also happen to be the most northerly examples of *c. capensis* known.

♂ ♀ . Mt. Mbololo. Above, head black, a five-scale wide transverse black band edged before and behind by ill-defined scale-wide light bands (which broaden on the sides) on nape; back and tail uniformly iridescent plumbeous or steely blue. Below, throat white, body also but so thoroughly infuscated with gray as to appear dusky.

♂. Mlalo, western Usambara Mtns. Above, as last, but the light bands on nape are broader, sharply distinct, and white (in alcohol); also there is a light spot present at the base of each dorsal scale. Below, similar to the Mbololo snakes.

♂. Lydenburg, Transvaal. Above, head black, a four-scale wide transverse black band edged before by a scale-wide buff band on nape; back and tail pinkish brown or pale brown with a fine brown vertebral line. Below, white. The width of the nuchal band varies from 3 to 6 rows in South African specimens in which the vertebral line may be black, if present, or absent altogether.

Size. Total length of ?♂, 290 (239 + 51) mm. from Lumbo; total length of ? ♀ , 410 (335 + 75) mm. from Cape Province (Werner, 1898, sex not stated. This is 100 mm. above any other record and may be a misprint).

Remarks. It would appear that after sending the description of *Elapomorphus capensis* to press, Sir A. Smith, realizing the name for his new genus was preoccupied, forwarded the manuscript of *Aparallactus capensis* to his publishers for substitution, for it is inserted under the caption of Sauria! Fortunately it has paragraph priority over the other description.

FitzSimons (1937a), after reëxamination, doubts that either of the specimens in the British Museum represent the type, though considered so by Boulenger (1896d).

A. guentheri of Boulenger was a composite of several specimens of *capensis* with divided nasals, which he had, and an example of *bocagii* with a divided nasal mentioned by Bocage, which Boulenger had not seen.

A. punctatolineatus Boulenger was based on another *capensis* mentioned by Bocage which had only 6 upper labials, the second and third

entering the orbit, a condition occurring spasmodically throughout the range of *capensis*. Later Boulenger (1896d) referred a Nyasaland snake to this species.

A. nigriceps of Boulenger was a composite of a specimen of *capensis* with 6 upper labials, etc., and the data derived from Peters' original description of *nigriceps*, which is distinguished from all other *Aparallactus* by its low ventral count (108–123).

The name *capensis* has not been applied to any other species except *bocagii*, which is distinguished by its much higher ventral count (168–191).

Dentition. Bogert (1940) after examination of three snakes from Nyasaland and Transvaal, found that the maxillary teeth ranged from 5 to 7 followed, after a diastema, by 2 enlarged grooved fangs.

Hemipenis. This is discussed at length by Bogert (1940).

Sexual dimorphism. There appears to be a slight overlap in the ventral count of this species for a Lydenburg ♂ in the Museum of Comparative Zoölogy has 148, while Boulenger (1896d) has recorded a ♀ from Zanzibar with that number.

Breeding. On April 27, at Mbanja, a ♀ held 2 eggs measuring 31 x 4 mm.

Dict. At Lumbo, one morning, a *Leptotyphlops longicauda* was captured together with several *Lycophidion semiannulis* and *Aparallactus c. capensis*. They were all put into a cigarette tin until evening when I should have time to attend to them. On opening the tin about 6 p.m. I was disagreeably surprised to find the valuable worm snake missing. As escape was out of the question I held up the other snakes, one by one, against a strong acetylene lamp until I found the worm snake doubled up in the stomach of a Cape black-headed snake.

So run my typescript notes of 25.viii.1918, but in recent years I have often wondered whether I did not make a mistake for a worm snake would be natural prey for a wolf snake, whereas, except for a snail, there is no other record of an Aparallactus eating anything else but a centipede. On the other hand see note below.

Temperament. At Lumbo, where I took sixteen of these little snakes, I observed that they bit quite fiercely at times but their tiny teeth failed to break through the skin. A nine-inch female attacked a five and a half inch snake, the latter seized its aggressor so that together they formed a struggling circle. If I had left them alone it seems possible that the larger would have dined off the lesser.

Habitat. This Lumbo series were mostly dug from about the roots of shrubs and grass though some were found on the surface of the

sandy soil in the early morning. Hewitt states that they are to be found in termitaria or beneath stones in open country, while V. Fitz-Simons has taken them beneath stones on granite hills. My Mbololo specimens were taken in a somewhat similar situation on the mountain-side just below the forest edge.

Localities. **Kenya Colony:** Mount Mbololo. **Tanganyika Territory:** Marangu, Kilimanjaro; Mbanja; Mlalo, w. Usambara; Mohorro; Sanya, Kilimanjaro; Tanga; Ujiji. **Zanzibar. Mafia Id. Mozambique:** Angoche; Lumbo; Rikatla; Tete. **Nyasaland:** Chiradzulu; Lake Nyasa; Mlanje; Shire Highlands; Zomba. **Southern Rhodesia:** Bulawayo; Gwelo; Salisbury district; Victoria Falls; Vumba Mountain. **Bechuanaland:** Serowe. **Zululand:** Entendweni; Ingwavuma (T.M.); Kosi Bay; Ntambanana (T.M.); Umfolosi Rivers junction. **Transvaal:** Blaauwberg (T.M.); De Kaap Goldfield; Delmas Road near Pretoria; Irene; Johannesburg (T.M.); Klein Letaba (T.M.); Kraalkop; Krabbefontein; Legogot; Lydenburg district; Modderfontein; Mphome; Nelspruit (T.M.); Punda Maria (T.M.); Rustenberg (T.M.); Selati; Shilowane; Woodbsuh (T.M.); Zeekoegat. **Orange Free State. Cape Province:** Burghersdorp; East London; Pondoland; Zingqolo. **Angola:** Quindumbo.

Range. Southeast Kenya Colony south to Cape Province.

Aparallactus capensis uluguruensis Barbour & Loveridge

1928c. *Aparallactus uluguruensis* Barbour & Loveridge, Mem. Mus. Comp. Zool., **50**, p. 132: Nyange, Uluguru Mountains, Tanganyika Territory.
1936j. Loveridge, p. 270.
1937f. Loveridge, pp. 493, 502.
1942e *Aparallactus capensis uluguruensis* Loveridge, p. 301.

Name. Uluguru Centipede-eater (English); *penge* (Pokomo).

Description. Rostral nearly twice, or twice, as broad as deep, the portion visible from above one third to two thirds as long as its distance from the frontal; nostril in an entire, semidivided, or divided nasal; internasals shorter than, or much shorter than, the prefrontals; frontal once and a half to once and two thirds as long as broad (in the middle), much longer than its distance from the end of the snout, shorter than the parietals, once and two thirds to twice as broad as a supraocular; no loreal; preocular 1, in contact with the nasal; eye

small, its diameter equal to, or greater than, its distance from the mouth; postocular 1, very rarely 2[1], not in contact with the anterior temporal; temporals 1 + 1, rarely 1 + 2[2]; upper labials 7, rarely 6[3], the third and fourth, rarely second and third[3], entering the orbit, fifth largest and in contact with a parietal; first lower labial not in contact with its fellow behind the mental; 3 lower labials in contact with the anterior sublinguals, which are as long as, or slightly longer than, the posterior. Midbody scales in 15 rows, smooth; ventrals 137–159; anal entire; subcaudals 43–53[4].

Based on the fourteen known specimens.

Color. Above, uniformly plumbeous or iridescent black. Below, as above or somewhat paler, more particularly on throat and tail which may be almost white. Young of 182 mm. are colored precisely like the adults.

Size. Total length of paratype ♂ (M.C.Z. 23366), 400 (320 + 80) mm. from Amani; total length of paratype ♀ (M.C.Z. 23364), 387 (333 + 54) mm. from Nyange.

Sexual dimorphism. ♂♂ have 137–144 ventrals, and 43–52 subcaudals. ♀♀ have 158–159 ventrals, and 44–51 subcaudals.

Breeding. At Ngatana, on June 17, a ♀ held 2 eggs, each measuring 12 x 5 mm. Four adult ♀♀ taken in the Uluguru and Usambara Mountains in October, November and December, were not breeding.

Diet. Six centipedes (*Alipes grandidieri* and another species) were recovered from the type series. A snail as well as two centipedes were present in the stomach of a Nyange snake. A seventh centipede in a Magrotto specimen.

Habitat. Beneath logs in montane rain forest and gallery forest.

Localities. **Kenya Colony:** Ngatana, Tana River. **Tanganyika Territory:** Amani, Usambara Mountains; Magrotto Estate, Magrotto Mountain; Nyange, Uluguru Mountains.

Range. Virgin forest in coastal belt of Kenya Colony and Tanganyika Territory.

[1] On left side only of M.C.Z. 23369.

[2] On left side only of an Amani paratype, right side of a Nyange paratype.

[3] On right side only of an Amani paratype.

[4] 58 was a misprint.

Aparallactus nigriceps (Peters)

1854. *Uriechis nigriceps* Peters, Monatsb. Akad. Wiss. Berlin, p. 623: Tete, Mozambique.
1855. Peters, p. 52.
1859?. Bianconi, p. 385.
1882a. Peters, p. 111, pl. xviii, figs. 1–1e.
1884a. Rochebrune, p. 154 (ignored).
1896a. Bocage, p. 100.
1857. *Eucritus atrocephalus* Jan, 1857, Cenni Museo Civico Milano, p. 44: Inhambane, Mozambique (*non vidi*).
1862. *Uriechis atriceps* Jan, p. 49 (lapsus for *nigriceps*).
1866. Jan, livr. 15, pl. i, fig. 4.
1895h. *Aparallactus nigriceps* Boulenger (part), p. 173.
1896d. Boulenger (part), p. 260 (no material).

Further citation of '*nigriceps*' will be found under *c. bocagii*.

Description. Rostral nearly twice as broad as deep, the portion visible from above one third to two thirds as long as its distance from the frontal; nostril in an entire nasal; internasals shorter than the prefrontals; frontal once and a half as long as broad (in the middle), much longer than its distance from the end of the snout, as long as, or slightly shorter than, the parietals; twice as broad as a supraocular; no loreal; preocular 1, in contact with, rarely separated from, the nasal; eye small, its diameter equal to, or greater than, its distance from the mouth; postocular 1, not in contact with the anterior temporal; temporals 1 + 1; upper labials 6, the second and third entering the orbit, fourth largest, fourth, or fourth and fifth, in contact with a parietal; first lower labial not in contact with its fellow behind the mental; 3 lower labials in contact with the anterior sublinguals, which are as long as, or slightly longer than, the posterior. Midbody scales in 15 rows, smooth; ventrals 108–123; anal entire; subcaudals 20–35.

Based on original descriptions and figures.

Color. Above, head black with white blotches, one anterior, one posterior, to the eye, black of crown continues on to nape where it is edged posteriorly with a yellow band; back and tail uniformly reddish olive brown except for the trace of a fine black vertebral line. Below, pale yellow.

Size. Total length of type, 225 (180 + 45) mm.

Sexual dimorphism. ?

Localities. **Mozambique:** Inhambane; Tete.

Range. Mozambique (known only from the type, and Bianconi's specimens in Milan Museum).

Genus Elapsoidea

1866a. *Elapsoidea* Bocage, Jorn. Sci. Lisboa, **1**, pp. 50, 70 (type *güntherii* Bocage).

1896d. *Elapechis* Boulenger, Cat. Snakes Brit. Mus., **3**, p. 358, footnote (substitute name).

Maxillary bone extending forwards as far as the palatine, with a pair of large grooved poison-fangs followed by 2–4 small teeth; anterior mandibular teeth longest. Head moderate, not or but slightly distinct from neck; eye small, with round pupil; nasal divided; loreal absent[1]; a single preocular. Body cylindrical; scales oblique, smooth, without pits, in 13[2] rows; ventrals rounded. Tail very short; subcaudals all or most in two rows.

Range. Africa south of 15° N., i.e. Senegal; Kordofan; Ethiopia.

Remarks. The substitute name *Elapechis* was proposed by Boulenger on the grounds that the correct form of *Elapsoidea* should be *Elapoidea*, which he considered preoccupied by *Elapoides* Boie, 1827, of Java.

In 1936 I invited attention to the fact that *güntherii* and *nigra* from the equatorial region, exhibit a higher ventral count than was the case with Angolan snakes being referred to *güntherii*. As no one investigated the subject I have attempted to straighten out the somewhat involved situation myself, though lacking material of the form *laticincta* occurring to the north of the thousand-mile-wide equatorial belt. All the remaining five forms are represented in the collections of the Museum of Comparative Zoölogy, which has 73 snakes of this genus, from which I exclude *multifasciata* and its synonym *duttoni*.

Thus we find ourselves left with a monotypic genus, and it has been no easy task to find characters wherewith to separate the various forms and, indeed, I have not attempted to do so in the case of *laticincta* (as opposed to *decosteri*) on account of the lack of material.

To judge by our single example of typical *sundevallii*, that race has an obtusely pointed snout. In this connection, however, it is important to note that Boulenger (1896d) had no material of typical *sundevallii* when he published his key to the 'species' of the genus. Later

[1] A small loreal-like scale appears in 1 of the 77 snakes examined.

[2] Boettger's statement that *boulengeri* had 15 was incorrect; *multifasciata* with 15–17 is not an *Elapsoidea* but a cobra.

(1897d) he obtained "several" and in his revised (1910b) key he dropped this character of snout shape which formerly had been treated as if of major importance. Was this because it broke down in series of even *sundevallii*? The snout is most definitely pointed in an adult ♀ *decosteri* (from Lumbo), less noticeably so in a young ♀ of the same form from Pretoria, or an adult ♀ *güntherii* from northern Kenya (Guaso Nyiro). The thought occurred that it might be a sexual difference, but it was found to be rounded in adult and juvenile ♀ ♀ of *güntherii* from western Kenya (Kaimosi and Loita Plains) just as much as in adult and juvenile ♂ ♂ of *semiannulata* from Angola or juvenile *decosteri* from Northern Rhodesia. I am inclined to the conclusion that it is an adaptation to environment, being rounded in specimens of *güntherii* and *nigra* living in the equatorial rain-forests where they have to burrow only in soft leaf mould, more often pointed in those snakes (*decosteri, fitzsimonsi* and *güntherii*) which live under savanna conditions. In practice one finds so many intermediate conditions between "obtusely pointed" and "rounded" that I could not utilize it as a key character.

The portion of the rostral visible from above is certainly greater in typical *sundevallii* and *fitzsimonsi* than in other forms with the exception of *decosteri* which would appear to link it with the more northern races.

The length of the internasals in relation to that of the prefrontals is a useless character, this also applies to frontal length in relation to its width, or to the length of the parietals, or to its distance from the end of the snout. I imagine that the relative lengths of the anterior and posterior sublinguals will probably be found to vary to much the same extent in *all* the races as soon as adequate series, such as have been available to me in the case of *güntherii* and *nigra*, have been studied.

Nevertheless, despite the fact that I regard almost all the matter furnished under the head of *Description* as practically valueless, I have included it as showing the carefully ascertained range of variation within the limits of each race as here defined. Such data having been obtained from the literature listed in the synonymy, together with the results of an examination of all the material at my disposal.

Under the heading *Localities*, the letter *T* after a locality signifies that scale counts of one or more specimens in the Transvaal Museum have been supplied me; the letters M.C.Z. in parentheses are placed only after such localities as have not yet appeared in the literature, and are to indicate that the specimen on which the record is based is in the collection of the Museum of Comparative Zoölogy.

Key to the Races[1]

1. Ventrals less than 169 2
   Ventrals 162–184 7

2. Ventrals 138–169; subcaudals 13–27 3
   Ventrals 151–166; subcaudals 13–30 6

3. Young with light crossbars about half the width of, or at least much narrower than, the interspaces between them; adults uniformly black 4
   Young with light crossbars subequal in width to the interspaces between them; adults black or brown with 14–22 *pairs* of well-defined white crossbars (formed by division of the solid bars of the young) 5

4. Range: Southern Ethiopia and Kordofan west through extreme northern Belgian Congo (Uelle) to northern Cameroons ..... *s. laticincta* (p. 216)
   Range: Mozambique, Nyasaland, and Northern Rhodesia south through Transvaal to Zululand and Orange Free State ..... *s. decosteri* (p. 217)

5. Range: Southern Belgian Congo and Angola ..... *s. semiannulata* (p. 220)

6. Subcaudals in males 23–30, in females 18–21; range: Kenya and northern Tanganyika Territory (Oldeani; Kilimanjaro) west through Uganda and Belgian Congo to Senegal ..... *s. güntherii* (p. 222)
   Subcaudals in males 18–24, in females 13–17; range: eastern Tanganyika Territory (Magrotto, Usambara, and Uluguru Mountains) ..... *s. nigra* (p. 225)

7. Adults and young slaty gray tinged with purplish brown with numerous white- or yellow-edged, black crossbars; range: Natal ..... *s. sundevallii* (p. 228)
   Adults uniformly purplish brown above, young barred as in the typical form; range: eastern Cape Province (Kimberly) west through Bechuanaland to South West Africa ..... *s. fitzsimonsi* (p. 229)

[1] Obviously unsatisfactory in some respects due to the lack of material representing *laticincta* and paucity for the two following forms; under the circumstances it has seemed best to give only the range rather than cite differences which may not prove to be constant.

STATISTICAL SYNOPSIS OF VARIATION IN THE RACES OF ELAPSOIDEA

Race	Ventrals	Subcaudals	Upper labials (entering orbit)	Lower Labials in contact with anterior sublinguals	Preocular	Postoculars	Temporals	Posterior nasal in contact (c) with preocular	Maximum length	
									Head and Body	Tail
s. laticincta	143-150	13-24	7 (3-4)*	3-3	1	2	1+2	C	430	28
s. decosteri	138-169	13-26	7 (3-4)	3-4	1	2	1+2*	C*	650	65
s. semiannulata	139-153	15-27	7 (3-4)	3-4	1	2	1+2	C	438	37
s. guntherii	151-166	18-30	7 (3-4)	3-4	1	2	1+2	C*	581	49
s. nigra	151-162	13-24	7 (3-4)*	3-4	1	2*	1+2*	C	548	37
s. sundevallii	163-184	19-27	7 (3-4)	3-4	1	2	1+2*	C*	825	55
s. fitzsimonsi	162-181	17-23	7 (3-4)	3-4	1	2	1+2	C	766	50

* See text for rare variation involving one side of one snake.

ELAPSOIDEA SUNDEVALLI LATICINCTA (Werner)

1917. *Elapechis guentheri* Sternfeld (not Bocage), p. 481.
1939c. Scortecci, p. 183, figs. 101–102.
1940a. Scortecci, p. 136, figs. 1–2.
1919. *Elapechis laticinctus* Werner, Denks. Akad. Wiss. Wien, **96**, p. 507, fig. 8: Kadugli, Kordofan, Anglo-Egyptian Sudan.
1923a. Werner, p. 179.

Description. Snout obtusely pointed; portion of rostral visible from above measuring half its distance from the frontal; internasals half the length of the prefrontals; frontal once and a third to once and a half as long as broad, as long as its distance from the end of the snout, two-thirds the length of the parietals; upper labials rarely 6, the second and third entering orbit (on right side of Filtu snake); anterior sublinguals slightly longer than the posterior.

For character common to all forms see p. 213; for scale counts see statistical table above.

Color. Young. Above, a goblet-shaped (Uelle specimen) prolongation of, or a black line from, the black nuchal crossbar extends over parietal suture, otherwise head grayish; body barred alternately black (about 8–10 scales wide) and gray (about 5 scales wide), the dark bars being about twice as broad as the light interspaces, which apparently number 14 on body, 2 on tail. Below, whitish.

Adult from Poli. Above, head and body uniformly black. Below, whitish.

Size. Total length of a supposed ♂ (with 24 subcaudals), 228 (203 + 25) mm. from Filtu (Scortecci), or a supposed ♀ (with 17 subcaudals), 458 (430 + 28) mm. from Poli (Loveridge), of juvenile type, supposedly a ♀ (with 13 subcaudals), 237 (220 + 17) mm.

Remarks. The above description, as well as data furnished in statistical table and key, is based on the information contained in the above citations together with the data derived from a large example from Poli, Garua, northern British Cameroons, submitted to me many years ago by the Vienna Museum. This is the only member of the northern form which I have seen and whether I am correct in lumping all together under the name *laticincta* remains to be seen. With inadequate material I have been unable to separate it from the southeastern race *decosteri*, to which Werner himself stated that it was related, allegedly differing from *güntherii* by its obtusely pointed snout. Remarks on the latter character will be found under the genus.

Diet. A skink (*Mabuya perroteti mongallensis*) in stomach of type.

Localities. **Ethiopia:** Filtu. **Anglo-Egyptian Sudan:** Kadugli. **Belgian Congo:** Angu, Uelle. **British Cameroons:** Poli near Garua. (Possibly some other northern Congo references to *güntherii* for which no scale-counts are given, and almost certainly the northern Nigerian record of Boulenger, repeated by Angel, are referable to *laticincta*).

Range. Southern Ethiopia and Kordofan west through northern Belgian Congo (Uelle) to northern Cameroons (and possibly northern Nigeria).

Elapsoidea sundevallii decosteri Boulenger

1888d. *Elapsoidea Decosteri* Boulenger, Ann. Mag. Nat. Hist. (6), **2**, p. 141: Delagoa Bay, Mozambique.
1895. *Elapsoidea Boulengeri* Boettger, Zoo. Anz., **18**, p. 62: Boroma, Zambesi, Mozambique.
1922a. Mertens, p. 182.
1937b. Mertens, p. 14.
1895. *Elapsoidea Guentheri* Günther (part, not of Bocage), p. 525 (Nyasaland only).
1934. Pitman, p. 298.
1937. Pitman (part), p. 346 (N. Rhodesia references).
1896. *Elapechis sundevali* Peracca (not Smith), p. 4.
1896d. *Elapechis guentheri* Boulenger (part), p. 359 (Nyasaland only).

1896. Peracca, p. 4.
1908. Gough, p. 33.
1909a. Chubb, p. 596.
1910b. Boulenger (part), p. 519 (Transvaal).
1912. FitzSimons, F. W. (part), pp. 166, 167.
1913. Hewitt & Power, p. 165.
1921a. Angel, p. 44.
1896d *Elapechis decosteri* Boulenger, p. 360.
1898. Sclater, p. 101.
1908b. Boulenger, p. 230.
1910b. Boulenger, p. 519.
1912. FitzSimons, F. W., pp. 166, 168.
1923a. Werner, p. 179.
1896d. *Elapechis boulengeri* Boulenger, p. 361.
1898. Boettger, p. 119.
1915c. Boulenger, p. 635.
1923a. Werner, p. 179.
1907a. *Elapechis niger* Boulenger (not Günther), p. 12.
1908c. Sternfeld, p. 247.
1912. Peracca, p. 6.
1923e. Loveridge (part), p. 890 (Lumbo only).
1934. *Elapsoidea* (*Elapechis*) *niger* Pitman, p. 298.
1908. *Elapechis sundevallii* Gough (part, not Smith), p. 34 (Orange River Colony).

Sternfeld's (1910b, 1910c) reference to *decosteri* is tentatively referred to *s. fitzsimonsi* subsp. nov.

Native name. Kouseband slang (Afrikaans: F. W. FitzSimons).

Description. Snout rounded or obtusely pointed; portion of rostral visible from above measuring half to three-quarters its distance from the frontal; half to three-quarters the length of the prefrontals; frontal once and a third to once and a half as long as broad, as long as, or longer than, its distance from the end of the snout, much shorter than, or two-thirds the length of the parietals; posterior nasal rarely separated from the single preocular, temporals only rarely 2 + 2; anterior sublinguals slightly shorter than, subequal to, or slightly longer than the posterior.

For characters common to all forms see p. 213; for scale counts see statistical table on p. 216.

Color. Young. Above, a goblet-shaped prolongation of the dark nuchal crossbar extends over parietal suture on to frontal, sides of head with dusky markings, otherwise head white or grayish; body barred alternately with chocolate brown (or black) and pale buff (or

white), the dark bars being much broader than the light interspaces which number 10–25 (normally 15–20) on body, 2–3 (rarely 4) on tail.

Adult. Above, head and body glossy black (fading to purplish brown in alcohol), or dark gray with each scale edged with black, uniform, or the outer row of scales whitish and sometimes with a trace of narrow white crossbars. Below, whitish or grayish.

Size. Total length of an unsexed specimen (Transvaal Mus. 16800), 715 (650 + 65) mm., from Manaba; of a gravid ♀ (M.C.Z. 18233), 500 (468 + 32) mm. from Lumbo; type of *decosteri* (S. Afr. Mus.), 450 (400 + 50) mm.; of juvenile type of *boulengeri* (Senck. Mus.), 170 (156 + 14) mm.

Remarks. E. decosteri was based on an unsexed snake which, to judge by its 25 subcaudals, is probably a male, for the same reason the smaller snake with 26 subcaudals allegedly a ♀ (Boulenger, 1896d) is likely to be a male also. *E. boulengeri,* based on a juvenile with consequently different color pattern to the old *decosteri,* was said to differ by the possession of 15 midbody scale-rows, however Mertens (1937b), on reëxamination of the type found that there are but 13. I therefore refer it to the synonymy of *decosteri.*

Peracca's (1896) records of both *sundevalli* and *güntherii* from Kazungula, S. R., here referred to *decosteri* may possibly be *fitzsimonsi.*

Breeding. On January 19, at Broken Hill, a ♀ held 10 large and elongate eggs (Pitman). On July 11, at Lumbo, a ♀ held 4 eggs, the largest measuring 17 x 7 mm.

Habitat. Two were dug from a termite hill in dry savanna bush at Lumbo, altitude *circa* 100 feet (A. L.).

Localities. **Mozambique:** Boroma; Zambesi; Chimbo (Tschimbo); Delagoa Bay; Lourenco Marques[T]; Lumbo. **Nyasaland:** Shire Highlands. **Northern Rhodesia:** Broken Hill to Bwana Mkubwa Mine; Lealui; Mbala, east Loangwa District. **Southern Rhodesia:** Bulawayo; Deka[T], 50 miles south of Victoria Falls; Eldorado; Gatooma[T]; Kazungula; Wankie. **Transvaal:** Ermelo[T]; Lydenburg District[T], Messina[T]; Middleburg[T]; Piet Retief[T]; Pilgrims' Rest[T]; Pretoria (M.C.Z.); Sabie[T]; Swaziland[T]; Waterberg[T]; Waterpoort[T]; White River[T]. **Zululand:** Kosi Bay; Manaba[T]; Maputa[T]. **Orange Free State.** (Transvaal Mus. specimen listed by Gough as *sundevallii,* but has only 152 ventrals).

Range. Zululand and Transvaal north to Mozambique and the Rhodesias. It is possible that this race extends north of the Rovuma

[T] Transvaal Museum specimens, not seen, but the data for which has been kindly supplied by Mr. F. W. FitzSimons.

River into southeastern Tanganyika Territory for Mr. R. de la B. Barker writes me (1.vi.41) that at Lindi he had found a snake, seven inches in length, with 14 white crossbars. On the other hand it may be a young *nigra* of brighter coloration at sea level than is usual in its forested montane habitat.

Elapsoidea sundevallii semiannulata Bocage

1873b. *Elapsoidea Güntherii* Bocage (not Bocage of 1866), p. 224.
1888a. Boettger (part), p. 82 (omit range).
1895a. Bocage (part), p. 129, pl. xiv, figs. 3a–c.
1896a. Bocage (part), p. 79 (Angola record only).
1897a. Bocage (part), p. 202 (Angola records only).
1933. Schmidt, p. 14.
1936h. Loveridge (part), p. 41 (Caconda only).
1937b. Mertens, p. 14.
1938e. Mertens, p. 442.
1940. Bogert, p. 86.
1882b. *Elapsoidea semi-annulata* Bocage, Jorn. Sci. Lisboa, **8**, p. 303: Caconda, Angola.
1887c. *Elapsoidea Hessei* Boettger, Zool. Anz , **10**, p. 650: Povo Netonna, Banana, Belgian Congo.
1888a. Boettger, p. 83, pl. ii, figs. 6a–e.
1922a. Mertens, p. 182.
1896d. *Elapechis hessii* Boulenger, p. 360.
1915a. Boulenger, p. 218.
1898. Boettger, p. 118.
1920a. Witte, p. 62.
1920b. Witte, p. 275.
1923a. Werner, p. 179.
1898. *Elapechis guentheri* Boettger (not Bocage), p. 118.
1937b. Monard, pp. 136, 137 (but omit range).
1900. *Elapsoidea güntheri* var *semiannulata* Ferreira, p. 52.

Description. Snout rounded or obtusely pointed; portion of rostral visible from above measuring a third or half its distance from the frontal; internasals two-thirds or three-quarters the length of the prefrontals; frontal once and a half as long as broad, longer than its distance from the end of the snout, slightly shorter than the parietals; rarely a small azygous scale between frontal and parietals[1]; anterior sublinguals separated from the mental except in the aberrant type of

[1] In a specimen from Povo Nemlao (Boettger).

hessei in which they were extensively in contact with the mental, subequal to, or slightly longer than, the posterior.

For characters common to all forms see p. 213; for scale counts see statistical table on p. 216.

Color. Young Topotype. Above, the apex of a ∧-shaped prolongation of the black nuchal crossbar extends over parietal suture to the frontal; a black circumorbital ring present or absent; loreal region and sides of head with dusky markings, otherwise head white; body barred alternately chocolate brown and white, the dark bars being subequal in width to the light interspaces, whose edges are even whiter, 15 (equal to 15 pairs in adult) white bars on body, 3 on tail. Below, throat white, rest whitish with dusky mottling especially along the edges of the scales.

Adult. Above, snout and sides of head olive, but lower portion of upper labials white, otherwise head and body black, grayish black, or light brown, the edges of some scales tipped with pure white to form narrow crossbars, of which there are from 14–22 *pairs* on body, 2–3 on tail. Below, whitish or yellowish, uniform, or with dusky mottlings accentuated on the edges of the scales.

Size. Total length of ♂ (A.M.N.H. 51837), 475 (438 + 37) mm. from ? Hanha, of ♀ (C.M. 5914), 337 (296 + 41) mm. from Chitau.

Anatomy. Bogert (1940) has described the hemipenis of an Angolan *semiannulata* as follows: "Extends to the eleventh caudal, bifurcating at the ninth. Sulcus bifurcates at the seventh caudal. Basal portion with small spines, a row of enlarged spines increasing in size distally on either side of the sulcus with smaller spines in the intervening space. On the side opposite the sulcus, a pair of enlarged spines is present in the region of the sixth caudal. Each fork is armed with small spines in longitudinal rows."

Diet. Two hymenopterous larvae in a Katanga snake (Mertens).

Localities. **Angola:** Caconda; Cazengo; Chitau; Cubal; Dondi, near Bella Vista (M.C.Z.); Galangue (Galanga); Gambos, Mossamedes; Kalukembe; Kampulu; Maconjo. **Belgian Congo:** (southern frontier): Dilolo to Muciacia; Povo Nemlao; Povo Netonna.

Range. Angola and southern Belgian Congo.

Elapsoidea sundevallii güntherii Bocage

1866a. *Elapsoidea Güntherii* Bocage, Jorn. Sci. Lisboa, **1**, pp. 50, 70, pl. i, figs. 3–3b: Cabinda, Portuguese Congo and Bissao, Portuguese Guinea.
1866b. Bocage, p. 70.
1884a. Rochebrune, p. 192 (ignored).
1884b. Sauvage, p. 201.
1895a. Bocage (part), p. 129 (exclude Angola).
1895. Günther (part), p. 525 (exclude Nyasaland).
1896. Tornier (part), p. 84 (exclude eastern Tanganyika).
1936h. Loveridge (part), p. 41 (exclude Angola).
1936j. Loveridge, p. 271.
1937c. Loveridge, p. 278.
1937d. Mertens, p. 9.
1937. Pitman (part), p. 346, pl. xiii, fig. 1, pl. N, fig. 3.
1937. Uthmöller, p. 123.
1938a. Pitman, pp. 218, 233.
1938b. Pitman, pp. 40, 81, 199, 257, 316, 331 (reprint with plates).
1938. Uthmöller, p. 46.
1942e Loveridge (part), p. 302 (exclude Magrotto).
1896d. *Elapechis guentheri* Boulenger (part), p. 359 (exclude Shire).
1896b. Mocquard, p. 45.
1897b. Boulenger, p. 280.
1897. Tornier, p. 65.
1900b. Boulenger, p. 455.
1902a. Boulenger, p. 447.
1906i. Boulenger, p. 215.
1907. Lönnberg, p. 16.
1908b. Sternfeld, pp. 220, 234.
1909a. Sternfeld, p. 23.
1910b. Boulenger (part), p. 519 (exclude Transvaal).
1910. Meek, p. 405.
1910a. Sternfeld (part), p. 37 (exclude eastern Tanganyika).
1911c. Boulenger, p. 167.
1915a. Boulenger (part), p. 218 (exclude Angola & Nyasaland).
1915c. Boulenger (part), p. 635 (exclude Angola & Nyasaland).
1916a. Loveridge, p. 86.
1916b. Loveridge, pp. 117, 120.
1917. Chabanaud, p. 381.
1917b. Chabanaud, p. 13.
1918a. Loveridge, p. 324.
1919b. Boulenger (part), p. 294 (exclude Angola & Nyasaland)
1920a. Witte, p. 62.
1920b. Witte (part), p. 274 (exclude Angola & Nyasaland).

1922c. Angel, p. 357.
1923e. Loveridge, p. 889.
1923a. Werner (part), p. 179 (exclude Angola & Nyasaland).
1924b. Loveridge, p. 7.
1933f. Angel (part), p. 185, figs. 69–69c (exclude Angola etc.).
1933m. Witte, p. 96.
1897b. *Elapechis moebiusi* Werner, Verh. Zool.-Bot. Ges. Wien, **47**, p. 400: Kete, Togoland.
1910a. *Elapechis niger* Sternfeld (part, not Günther), p. 37.
1920a. Witte, p. 62.
1920b. Witte, p. 275.
1923e. Loveridge (part), p. 890 (exclude Lumbo, Mozambique).
1934a. *Elapechis* sp. Schwetz, p. 381.

Among the above citations will be found those with or without the final 'i', others with the 'ü' or 'ue' rendering, it has not been thought necessary to indicate such minor deviations. Further citations of '*güntherii*' will be found under *s. nigra, s. semiannulata, s. decosteri* and *s. laticincta.*

Native name. Mugoya (Gishu), a name which is applied to any *Typhlops* or *Leptotyphlops* in Ganda or Soga, *fide* Pitman.

Description. Snout rounded; portion of rostral visible from above measuring a third to half its distance from the frontal; internasals two-thirds to three-quarters the length of the prefrontals; frontal once and a quarter to once and a half as long as broad, as long as, or longer than, its distance from the end of the snout, slightly shorter than, rarely equal to, the length of the parietals; posterior nasal rarely separated from the single preocular; anterior sublinguals slightly shorter than the posterior.

For characters common to all forms see p. 213; for scale counts see statistical table on p. 216.

Color. Young, ex. Kenya. Above, head as well as body, dark, the white crossbars or bands broader than in adults, where each white bar has split to form a pair.

Adult. Above, head and body plumbeous gray, brown, or black, uniform, or the edges of some scales tipped with white to form transverse series of white dots arranged in broad or narrow crossbars of which there are some 15 to 33 pairs on body and 3 to 5 on tail. Below, yellowish or whitish, each scale lightly edged with dusky, or grayish, brownish, or black, the gular region usually lighter.

Whether snakes from Kenya (east of Kaimosi, Elgon and the Burnt Forest) are separable by color remains to be demonstrated. The half-

dozen Nairobi specimens which I captured had coral pink or red centres to the white crossbars separating the black interspaces. Whether such is the case with snakes from the Guaso Nyiro, Njoro, and Loita Plains is not known. Pitman records the eyes of two Bukalasa snakes as being black with invisible pupil, and translucent with silver pupil respectively.

Size. Total length of ♂ (M.C.Z. 40721), 630 (581 + 49) mm., and of ♀ (Mich. Mus.), 627 (583 + 44) mm., both from Kaimosi. The former was erroneously cited as a ♀ in a previous paper.

Remarks. The type of *moebiusi*, measuring 442 (412 + 30) mm., was dark brown above and light yellow below. Its author acquiesced in Boulenger's action in referring it to the synonymy of *güntherii*.

Snakes from northern Tanganyika Territory recorded by Mertens and Uthmöller are somewhat intermediate, agreeing more closely with *güntherii* than with *nigra*, however.

Angel (1922c) records an aberrant individual from Clermont House, Nairobi, in which the rostral, internasals, first and second upper labials are irregularly broken up into small scales; the posterior nasal is in contact with the preocular on one side, separated on the other; the supraocular is divided on the right side only.

Loveridge (1936j) was in error in giving temporals as 1 + 3 and ventrals 167, the former was a misprint for 1 + 2, the latter a miscount for 166.

Breeding. On September 10, at Kaiso, small eggs present in ovary (Pitman).

Diet. Four lizard eggs, each measuring 8 x 4 mm., were found in the stomach of a Nairobi snake.

Defence. Black specimens, apparently uniformly so, by sudden inflation of the lungs bring into prominence the previously concealed white-tipped bases of certain scales, thus producing an annulate effect which is quite startling.

Temperament. Naturally peaceable and inoffensive, biting only upon real provocation. In Parklands Forest Reserve I nearly trod on one which was sluggishly making its way through the sparse herbage which had sprung up with the advent of the rains.

Habitat. Sea level to 7000 feet. Pitman found a specimen in a recently-planted cotton patch on the Kaiso plain, usually, however, this somewhat secretive species is encountered on, or at the edge of, forest. The Burnt Forest record is based on a snake which was crossing the road at dusk, I held it down with my cycle pump, examined, then released it.

Localities. **Uganda:** Budongo Forest; Bukalasa, 30 miles north of Kampala; Bussu; Kabanda; Kagera River mouth; Kaiso-Tonya Plain on east shore of Lake Albert; Kaliro in Busoga (A.M.N.H.); Mabira Forest; Ruwenzori — foot of; Serere, Teso; Sese Ids.; Sipi, Mt. Elgon. **Kenya Colony:** Burnt Forest; Guaso Nyiro (M.C.Z.); Kaimosi; Kajiado; Kakamega; Kijabe; Loita Plains (M.C.Z.); Nairobi; Njoro; Parklands, Nairobi. **Tanganyika Territory** (northern and western): Kagera (as Kagehi); Kibonoto; Oldeani; Sanya. **Portuguese Congo:** Cabinda. **Belgian Congo:** Dramba; Kunungu; Mahagi Port; Stanley Pool; Stanleyville; Yakoma. **French Equatorial Africa:** Fort Sibut; Kuango River. **Nigeria.** Dahomey: Agouagou. **Gold Coast. Togo:** Kete; Mangu; Misahöhe. **Portuguese Guinea:** Bissau; Rio Cassine. **Senegambia:** Guidimaka.

Range. Northern Tanganyika Territory and Kenya Colony west to Senegal.

Elapsoidea sundevallii nigra Günther

1888b. *Elapsoidea nigra* Günther, Ann. Mag. Nat. Hist. (6), **1**, p. 322: "Ushambola" i.e. Usambara Mountains, Tanganyika Territory.
1895b. Werner, p. 193.
1896. Tornier, p. 84.
1928e. Loveridge, p. 117.
1896d. *Elapechis niger* Boulenger, p. 359, pl. xx, fig. 1.
1897. Tornier, p. 65.
1910a. Sternfeld (part), p. 37, fig. 43 (Nguelo and Tanga only).
1915a. Boulenger (part), p. 218 (omit Congo and Northern Rhodesia).
1915c. Boulenger (part), p. 635 (omit Congo and Northern Rhodesia).
1920. Aders, p. 338.
1923a. Werner (part), p. 179 (omit Congo and Northern Rhodesia).
1924b. Loveridge (part), p. 7 (omit Kenya Colony and Zanzibar).
1940. Parker, Moreau & Pakenham, pp. 310, 313.
1896. *Elapsoidea güntherii* Tornier (part), p. 84 (Bulwa, Magila, Tanga).
1928c. Barbour & Loveridge, p. 134.
1937f. Loveridge, p. 502.
1942e. Loveridge (part), p. 302 (Magrotto only).
1910a. *Elapechis Guenthcri* Sternfeld (part), p. 37 (Bulwa, Magila, Tanga).
1911b. Nieden, p. 442.

Further citations of "*nigra*" or "*niger*" will be found under *s. güntherii* and *s. decosteri.*

Native name. Kifutu (Sambara).

Description. Snout rounded; portion of rostral visible from above measuring a quarter to a third its distance from the frontal; internasals rarely half, usually two-thirds to three quarters, rarely equal to, the length of the prefrontals; frontal once and an eighth to once and a half as long as broad, rarely as long as, more usually longer than, its distance from the end of the snout, slightly shorter than, or two thirds the length of the parietals; postoculars only rarely 1; temporals only rarely 1 + 1; anterior sublinguals subequal to, or slightly longer than, the posterior.

For characters common to all forms see p. 213; for scale counts see statistical table on p. 216.

Other aberrations noted are: a small azygous scale between prefrontals and frontal in M.C.Z. 23411, and topotypes 23424, 23435; a minute loreal present in topotype M.C.Z. 23427; the specimen (M.C.Z. 23413) with a single postocular has it on the left side only; a small azygous scale is present between lower postocular and temporal on both sides of M.C.Z. 23424, 23427, 23435, and on right side only of 23441.

Color. Young. Above, the apex of a Λ-shaped prolongation of the nuchal crossbar extends over parietal suture, otherwise head white or brownish above; body gray with about a score of black crossbars narrowly edged with white, the dark bars being subequal in width to the gray interspaces; tail uniformly black. It will be observed that the light transverse bars of the young progressively disappear with age, from the tail forwards, to produce the uniformly black adults. Below, whitish anteriorly, grayish posteriorly.

Adult. Above, head and body glossy iridescent black, uniform or the edges of some scales tipped with white to form transverse series of white dots or narrow crossbars, of which there may be some 18–24 *pairs* on the body. Below, usually uniformly black, paler or even white upon the throat, very rarely a few white patches in the middle of the ventrals.

Size. Total length of ♂ (M.C.Z. 48448), 585 (548 + 37) mm. from Magrotto, of ♀ (M.C.Z. 23455), 494 (460 + 34) mm. from Bumbuli, of type ♀ (Brit. Mus.), 420 (390 + 30) mm. A 569 mm. specimen, listed by me as ♀, proves on reëxamination to be a ♂.

Remarks. Sternfeld's (1910a) statement that the anal is divided was just a slip.

Breeding. On October 1, at Nyange, a ♀ held 2 eggs measuring 40 x 10 mm. On November 29–30, at Amani, four ♀ ♀ held 2, 3, 4, and 4 eggs respectively, of which the largest measured 27 x 10 mm. On

December 16, at Bumbuli, two ♀ ♀ held 4 and 5 eggs respectively, the latter measuring 37 x 12 mm.

Diet. Caecilians (*Boulengerula boulengeri*) of which 7 were recovered from the stomachs of 6 snakes, for details see Barbour and Loveridge (1928).

Parasites. Nematodes (*Kalicephalus* sp.) and their cysts taken from Amani snakes, cestodes (*Proteocephalus* or *Ophiotaenia elapsoidea*, and *O.* sp. near *mönnigi*) taken from Amani and Nyange reptiles, mites beneath ventrals of Amani specimen.

Temperament. If gently handled this montane snake makes no attempt to bite so cannot be considered a vicious species. Apparently wholly black examples, their small heads scarcely larger than their bodies, are sufficiently like burrowing vipers (*Atractaspis rostrata*) to be mistaken, others which at first sight appear entirely black, will, if molested, inflate their lungs and thus bring into prominence the series of transverse bars, causing them to look like *Crotaphopeltis h. hotamboeia*. Two Magrotto snakes had lost the ends of their tails, perhaps through fighting; one had a very truncated stump.

Habitat. Vicinity of montane rain forest between 2000 and 3000 feet, in heaps of debris within or without the forest. In the Usambara forests several were encountered on paths between noon and 3 p.m., but at Magrotto I captured four wandering on paths about sunset, their empty stomachs suggesting the reason for their being abroad.

Localities. **Tanganyika Territory:** Magrotto Mountain; Tanga; Uluguru Mountains — Nyange; Usambara Mountains — Amani; Bulwa (Buloa); Bumbuli; near Magila; Nguelo.

Because Sir John Kirk, H. M. Consul at Zanzibar, sent home the type from Ushambola, Boulenger concluded that Ushambola was in Zanzibar. Finding the species abundant in the Usambara Mountains in 1926, I surmised that Ushambola was an archaic spelling of Usambara for Sir John's duties took him up the Pangani River in what was once called the Usambara district. Moreover Aders (1920) remarks that he had never come across the species on the island, but for further confirmation I approached the Survey Department in Zanzibar who replied that they had no knowledge of such a locality as "Ushambola" on the island. **Zanzibar,** therefore, must be excluded from the range.

The three records of the occurrence of *nigra* in Mozambique, Nyasaland, and Northern Rhodesia, are referable to the race *s. decosteri* whose adults are just as black as *nigra* but have a much lower ventral count.

Range. Eastern Tanganyika Territory (Usambara, Magrotto, and Uluguru Mountains).

Elapsoidea sundevallii sundevallii (Smith)

1848. *Elaps sunderwallii* (*sic*) A. Smith, Ill. Zool. S. Africa, Rept., p. lxvi: "South Africa to east of Cape Colony."
1880c. Peters, p. 797, pl. –, fig. 2 (*sundevallii*, emend).
1887h. Boulenger, p. 180.
1896d. *Elapechis sundevallii* Boulenger, p. 360.
1897d. Boulenger, p. 375.
1898. Sclater, p. 101.
1898. Werner, 1896–7, p. 147 (see Remarks below).
1908b. Boulenger, p. 230.
1908. Gough (part), p. 34 (omit Orange River Colony).
1910b. Boulenger, p. 519.
1912. FitzSimons, F. W., pp. 166, 168(omit Griqualand and Basutoland).
1923a. Werner, p. 179 (but restrict range to Natal).
1937e. *Elapsoidea sundevallii* Hewitt, p. 78.
1937a. FitzSimons, V., p. 263.

Another citation of '*sundevalli*' will be found under *s. decosteri.* From Werner onwards several authors have dropped the final 'i' from *sundevallii*; it has not been thought necessary to indicate such trifling deviations.

Description. Snout obtusely pointed; portion of rostral visible from above two-thirds of, equal to, or greater than, its distance from the frontal; internasals half to two-thirds the length of the prefrontals; frontal once and a third to once and a half as long as broad, slightly shorter than, as long as, or longer than, its distance from the end of the snout, slightly shorter than, or two-thirds the length of the parietals; posterior nasal rarely separated from the single preocular; temporals only rarely 1 + 1; anterior sublinguals subequal to, or slightly longer than, the posterior.

For characters common to all forms, see p. 213; for scale counts see statistical table on p. 216.

Color. Young. Above, the apex of a Λ-shaped prolongation of the black nuchal crossbar extends over parietal suture forwards to prefrontals; body barred alternately with black and white, the bars being of equal width, edges of the pale bars lighter and doubtless persisting to form the narrow crossbars of the adult. Below, yellowish.

Adult. Above, slaty gray with a reddish or purplish brown tinge, or

rusty brown, at least part of labials and lower temporal region yellowish, body and tail with 14 + 3[1] to 34 + 4 white- or yellow-edged black crossbars, which are as broad as, or much broader than, the interspaces between them, though often narrowing on the sides. Below, usually including lower lateral scale-row, yellowish or whitish, with or without dusky mottling or brownish marbling.

Size. Total length of an unsexed snake (Brit. Mus.), 880 (825 + 55) mm., and of a ♀ (Werner, 1898), 625 (590 + 35) mm.

Remarks. Smith (1848) gives a detailed account of the type which is worth consulting, its accuracy is vouched for by Peters (1880c) who borrowed the type and a juvenile example from the Royal Swedish Museum before transferring the species to *Elapsoidea* of Bocage, which genus he considers to be closely related to *Hemibungarus* Peters (i.e. *Calliophis* Günther) of southeast Asia.

Peracca's (1896) identifications of "*sundevali*" and "*guentheri*" as occurring at Kazungula on the south bank of the Zambesi, Southern Rhodesia, are both referred to *s. decosteri* though there is a remote possibility that one might be the young of *fitzsimonsi*.

Werner's (1898) record of the 'Cape' must be considered erroneous pending confirmation. His paper deals with three collections, whose source he indicates by putting a 'K' (Kap), 'N' (Natal), or 'T' (Transvaal) after the species. I suggest that the 'K' which appears after his undoubtedly typical *sundevallii*, may well have come from a carelessly written manuscript 'N'.

Gough (1908) mentions several abnormalities, but his "O.R.C" (i.e. Orange River Colony, now Orange Free State) record really refers to a *decosteri*, as does a Pretoria specimen (M.C.Z. 14194) labeled "*sundevallii*" when received from the Transvaal Museum in 1920.

Localities. See three preceding paragraphs. **Natal:** De Deur near Evanton; Durban; Estcourt; Newcastle.

Range. Natal.

Elapsoidea sundevallii fitzsimonsi subsp. nov.

1910b. *Elapechis Decosteri* Sternfeld (not Boulenger), p. 31.
1910c. Sternfeld, p. 57.
1913. *Elapechis sundevalli* Hewitt & Power (not Smith), p. 165.
1935b. FitzSimons, V., p. 326.
1937b. *Elapsoidea sundevallii* Mertens (not Smith), p. 15.

[1] The lower number apparently results from loss of the white edging and consequent fusion of two dark crossbars, which results in the dark bars being much narrower than the interspaces.

Type. Chicago Natural History Museum, No. 17667, an adult ♂ from Gomodimo Pan, Kalahari Desert, Bechuanaland Protectorate, collected by Herbert Lang, April, 1930.

Paratypes. C.N.H.M. No. 17668, a ♂ with same data as type; C.N.H.M. 17666, a ♀ taken between Gomodimo and Kuke; also Transvaal Museum (not seen, but data supplied by V. FitzSimons) from Okwa River and Damara Pan respectively, all collected by the Vernay-Lang Kalahari Expedition in April, 1930.

Diagnosis. Differs from typical *sundevallii*, with which it agrees in other respects, in being uniformly purplish brown when adult.

Description. Nasal and preocular in contact; preocular 1; postocular 2; temporals 1 + 2; upper labials 7, the third and fourth entering the orbit; lower labials 6–7 of which the first 3 (3–4 in paratypes) are in contact with an anterior sublingual; ventrals 181 (162–177, not 164–178); subcaudals 21 (17–23).

Snout obtusely pointed; portion of rostral visible from above two-thirds of, or equal to, its distance from the frontal; internasals half to two-thirds the length of the prefrontals; frontal once and a third to once and a half as long as broad, slightly shorter than, as long as, or longer than, its distance from the end of the snout, slightly shorter than, or three-quarters, the length of the parietals; anterior sublinguals subequal to the posterior. (This paragraph is based only on the three specimens examined.)

Color. Young. Above, the apex of a Λ-shaped prolongation of the black nuchal crossbar extends over parietal suture forwards to prefrontals; a dark spot behind eye; sides of head yellowish; body barred alternately with dark slaty brown or black, and pale yellowish or white, the bars being of equal width, edges of the pale scales usually dark-edged. Below, yellowish.

"Adult and halfgrown. Above, uniform dark slaty gray, with a reddish or purplish brown tinge, paler posteriorly and on sides; upper lip, outer row of scales and lower half of adjacent row, creamy white. Below, uniform creamy white, snout and sides of tail tinged with pinkish."

Size. Total length of type ♂ (C.N.H.M. 17667), 714 (671 + 43) mm., surpassed by a ♂ (T.M. 887), 766 (716 + 50) mm.; paratype ♀ (C.N.H.M. 17666), 606 (570 + 36) mm.

Remarks. Named for Mr. Vivian FitzSimons of the Transvaal Museum, who supplied me with numerous scale-counts, and who was the first to invite attention to this form, and whose admirable account of the coloration I have given above.

FitzSimons (1935b) suggests, and probably correctly, that Sternfeld's (1910b) record of *decosteri* from South West Africa is the same as these Bechuanaland specimens. If correct, then Sternfeld's figure of 157 ventrals requires checking as it is slightly lower than the accepted range (162–181).

Whether Peracca's (1896) record of *sundevallii* from Kazungula on south bank of Zambesi, Southern Rhodesia, is referable to this form or to *s. güntherii* where I have put it, is open to question.

Habits. These active snakes were usually found in the vicinity of pans, where their coloration rendered them conspicuous on the light colored sand, in early evening following rain (FitzSimons).

Localities. See remarks above. **Bechuanaland:** Damara Pan; Gomodimo Pan; Gomodimo to Kuke; Okwa River. **Cape Province:** Kimberly; Kimberly Mine. **South West Africa:** Gobabis (as *decosteri*); Okahandja (Transv. Mus.); Okanjande near Otjiwarongo (Mertens).

Range. Eastern Cape Province (Kimberly) west through Bechuanaland Protectorate to South West Africa.

Genus Paranaja gen. nov.

Genotype. Naja multifasciata anomala Sternfeld (M.C.Z. 22380).

Maxillary bone extending forwards as far as the palatine, with a pair of large grooved poison-fangs followed by 2 small teeth; anterior mandibular teeth longest. Head moderate, slightly distinct from neck; eye moderate, with round pupil; nostril between two nasals and an internasal; loreal absent; a single preocular. Body cylindrical; scales oblique, smooth, without pits, in 15–17 rows; ventrals rounded. Tail short; subcaudals in two rows.

Range. Africa from the Belgian Congo to French Cameroon.

Remarks. Though agreeing with *Elapsoidea* in the degree of forward extension of the maxillary bone, the new genus is readily distinguishable from it by external characters such as the larger eye, oblique nature of scalation, and relatively longer tail which in *Elapsoidea* is *very* short.

The interesting species on which this monotypic genus is based, was first referred to *Naia* (=*Naja*) by its discoverer (1902a) but later was transferred to *Elapechis* (=*Elapsoidea*) with a query by Boulenger (1915a) who had already described it (1904d) as an *Elapechis*. Sternfeld (1917), with only a head, described under the appropriate name *anomala* as a full species what appears to be a recognizable race.

Bogert, who has recently been studying cobra skulls (1943), and to whom I am indebted for the following notes based on his dentitional examination, considers *Paranaja* most closely related to *Pseudohaje* for the palatine in both genera is almost identical in shape, exhibiting a long internal process above the point where it is connected to the prevomer (vomer of most authors), moreover the external process (processus maxillaris) is elongated as in *Pseudohaje* in contrast to the condition obtaining in *Naja* and *Elapsoidea;* in the latter the internal process is greatly reduced, while in *Naja* it is more or less truncate, the curved extension at the posterior end of the process being absent in most species and only feebly developed in *Naja haje.* In view of the similarity of the palatine, as well as agreement with *Pseudohaje* in general shape of the ectopterygoid, pterygoid, and maxillae, it appears probable that other skull characters (no skull being available for examination at the present time) will be found to conform with those of *Pseudohaje.*

Though the distal aperture of the fang in *anomala* is small, as in *Pseudohaje,* Bogert finds the fang length — 1.6 mm. (measured by Klauber's method) is contained 250 times in total length, and is, therefore, proportionately about half as large again as in *Pseudohaje* and but slightly larger than in most *Naja.* The further dentition of *anomala,* as shown by M.C.Z. 22380, is: palatine 9–9, pterygoid 19–19, dentary 17–17. Though the palatine count is higher than encountered by Bogert in any African species of *Naja,* it is sometimes exceeded in the Asiatic *N. naja naja.*

The scalation is so irregular that any count is apt to be a trifle confused, for on the specimen in question Bogert found a row dropping out and then reappearing again, the formula being something like 19–17–15–16–15–13, and adds that in all *Pseudohaje* examined by him the preanal count was constantly 11.

The diameter of the eye in *Pseudohaje* is about half its distance from the mouth, whereas in *Paranja* it is about equal to the distance; such comparisons, however, are likely to be affected by the age of the snake. The ratio of tail into total length is .16, or nearly twice that of *Elapsoidea,* though our specimen is a female.

Thus in the number of teeth on the respective bones, in the number of scales and their imbrication, in size of eye, and in relative tail length, *Paranaja* agrees more nearly with *Naja* than with *Pseudohaje.*

If I were asked to speculate on lines of descent, I would suggest that *Naja,* entering Africa from the northeast, gave rise to both the allegedly arboreal *Pseudohaje* and the presumably terrestrial *Paranaja,* the latter

retaining many *Naja* characteristics. Both are sylvicoline as is *Naja melanoleuca* which likes to bask in trees or is ready to take to them; on the other hand only once have I found the savanna-haunting *N. n. nigricollis* off the ground, and then only in a Bougainvillea.

Key to the Races

Upper labials 7, sixth largest; range: Belgian Congo, i.e. south of the River Congo ..... *m. multifasciata* (p. 233)

Upper labials 6, fifth largest; range: French Cameroons, i.e. north of the River Congo ..... *m. anomala* (p. 234)

Paranaja multifasciata multifasciata (Werner)

1902a. *Naia multifasciata* Werner, Verh. Zool.-Bot. Ges. Wien, **52**, p. 347: Upper Maringa River, Belgian Congo.
1923a. Werner, p. 183.
1904d. *Elapechis Duttoni* Boulenger, Ann. Mag. Nat. Hist. (7), **14**, p. 15: Leopoldville, Belgian Congo.
1915a. Boulenger, p. 218.
1920a. Witte, p. 62.
1920b. Witte, p. 275.
1923a. Werner, p. 180.
1933a. Witte, p. 70.
1915a. *Elapechis* ? *multifasciatus* Boulenger, p. 219.
1920a. Witte, p. 62.
1920b. Witte, p. 275.
1933a. Witte, p. 70, figs. 1–3.

Description. Snout broadly rounded; rostral broader than deep, the portion visible from above measuring from a third to two-thirds its distance from the frontal; internasals three-quarters the length of the prefrontals; frontal once and a half as long as broad, slightly shorter than, as long as, or longer than, its distance from the end of the snout, two-thirds or four-fifths the length of the parietals; posterior nasal in contact with the single preocular; eye as long as, or longer than, its distance from the nostril; postoculars 2–3; temporals rarely 1 + 2, usually 1 + 3, rarely 2 + 3; upper labials 7, the third and fourth entering the orbit, sixth largest; 4 lower labials in contact with the anterior sublinguals, which are separated from the mental, and slightly shorter than, or as long as, the posterior. Midbody scales in 15–17

rows, 17–19 on neck, 19–21 immediately behind parietals; ventrals 150–174; subcaudals 31–38, all or most in two rows.

Color. Above, snout and sides of head whitish, a dark transverse bar across internasals, a dark streak over labial suture beneath eye, followed by others on labial sutures and temporal region; head (from prefrontals) and body pale brownish, each scale with a dark spot posteriorly resulting in the formation of a series of angular crossbands. Below, whitish.

Size. Total length of *multifasciata* type (Mus. Roy. Hist. Nat. Bruxelles, presumably a ♂ as with 38 subcaudals), 525 (462 + 63) mm., of *duttoni* type (Brit. Mus., presumably a ♀ as with 31 subcaudals, though Boulenger suggested that it might be a ♂), 520 (450 + 70) mm.

Remarks. Werner (1902a) considered that *multifasciata* was most nearly related to "*Naja goldii*" from which it was readily distinguished by its low subcaudal count. Witte (1933a), who reëxamined and figured the type, states that the two suboculars described by Werner are nonexistent, and finds 19 instead of 17 scale-rows on the neck, perhaps the explanation may be found in Witte's count having been made nearer the head (*vide Remarks* under genus). Witte also amends the ventral count from 172 to 174, and that of the subcaudals from 36 to 38, strangely enough he has a specimen from Balombo with precisely the same counts — 174 and 38.

Boulenger claimed that *duttoni* was closely related to *E. s. nigra*, an entirely erroneous view; indeed it is somewhat surprising that he ever should have considered placing "*duttoni*" in the genus "*Elapechis*" from which it differs in the head being slightly distinct from the neck, the moderate eye, the nostril being between two nasals *and an internasal*, midbody scales in 15–17 (instead of 13) rows, with 17–19 on neck, and a tail which is only moderately short.

Localities. **Belgian Congo:** Besankusu; Bolombo (Bolombe); Leopoldville; Upper Maringa River.

Range. Belgian Congo.

Paranaja multifasciata anomala (Sternfeld)

1917. *Naja anomala* Sternfeld, Wiss. Ergeb. Zweit. Deutschen Zent.-Afr.-Exped. 1910–1911, **1**, p. 482, pl. xxiv, fig. 9: Assobam Forest region, French Cameroons.

1922a. Mertens, p. 182.

1923a. Werner, p. 182.

1924b. Werner, p. 45.

Description. Differs from the typical form only in those characters mentioned in the key and also, though of no consequence, in the portion of the rostral visible from above measuring from a quarter (type) to two-thirds (M.C.Z. specimen) its distance from the frontal, and the anterior sublinguals being slightly longer than the posterior (type and M.C.Z.). It may be thought by some that these are rather slender grounds on which to recognise a race; in view of a definite geographical barrier, however, the action seems justifiable. As the species is so rare, I append the scale-counts so far published, those of Werner's type as amended by Witte.

P. m. multifasciata

Source	Locality	Midbody scales	Ventrals	Subcaudals	Upper labials (enter orbit)	Postoculars
Type	U. Maringa	15	174	38	7 (3rd & 4th)	2
duttoni	Leopoldville	15	150	31	7 (3rd & 4th)	3
Witte 1933a	Basankusu	17	164	32	?	?
	Bolombo	17	174	38	?	?

P. m. anomala

Source	Locality	Midbody scales	Ventrals	Subcaudals	Upper labials (enter orbit)	Postoculars
Type	Assobam F.	?	?	?	6 (3rd & 4th)	2
M.C.Z.	Bitye, Ja R.	16	164	34	6 (3rd & 4th)	2
Werner 1924b	?	15	157	35	6 (3rd & 4th)	?

Size. Total length of larger (Werner, 1924b, probably ♀), 515 (440 + 75) mm., of known ♀ (M.C.Z. 22380), 463 (400 + 63) mm.

Remarks. Sternfeld (1917) based his *anomala* on a head only, while noting its similarities to *multifasciata* he was misled by Werner's misstatements regarding the presence of suboculars. He believed that *anomala* has a deeper rostral and larger eye, and went on to compare it with *Naja melanoleuca* of the same size which had an even larger eye. Werner (1924b) records a second example in the Vienna Museum.

Localities. **French Cameroons:** Assobam (Assobom); Bitye, Ja River.

Range. French Cameroons.

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of 319 works mentioning the species dealt with in this paper from 1735–1943. No attempt has been made to complete those prior to 1880, but 1766 contributions to African herpetology published since 1880 have been searched. Titles of papers are omitted for the sake of brevity.

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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
Vol. XCV, No. 3

A REVISIONAL STUDY OF THE FOSSIL SYRPHIDAE

By Frank Montgomery Hull
University of Mississippi

With Thirteen Plates

CAMBRIDGE, MASS., U.S.A.
PRINTED FOR THE MUSEUM
April, 1945

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OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY AT HARVARD COLLEGE

The Bulletin and Memoirs are devoted to the publication of investigations by the Staff of the Museum or of reports by specialists upon the Museum collections or explorations.

Of the Bulletin, Vols. I to XCIV, and Vol. XCV, No. 1, 2 and 3 have appeared and of the Memoirs, Vol. I to LV.

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Publication of Memoirs ceased with Vol. LV.

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No. 3.—*A Revisional Study of the Fossil Syrphidae*

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INTRODUCTION AND ACKNOWLEDGEMENTS

Although many fossil Syrphidae have been described during the past century, no one has attempted a comprehensive treatment of them. The specific details within this family are often obscure, and a study of this kind is needed in order to relate the fossil species to the Recent genera. This effort toward a revision of the fossil Syrphids began with a study of the excellent collection in the Museum of Comparative Zoölogy at Harvard University. I am indebted to Dr. F. M. Carpenter and Dr. C. T. Brues for the suggestion that a study of the fossil Syrphids might be replete with interest, and furnish some insight into the phylogenetic history of the group. I wish further to thank Dr. Carpenter for neverfailing advice of many kinds, for much discussion and encouragement. Besides allowing me to examine the very unusual collections of the Museum of Comparative Zoölogy, he has secured the loan of a number of types, all of which made this study possible. In addition, I am deeply indebted to Dr. C. T. Brues for many kindnesses and much advice. To Professor Nathan Banks I owe much thanks for helpful suggestions and for permitting me access to

important collections in which I found representatives of fully half of the living genera.

My thanks are due to Dr. E. A. Chapin of the U. S. National Museum and the late Dr. F. E. Lutz of the American Museum, not only for the loan of material but for placing facilities for study before me in visits to their institutions; to Professor T. D. A. Cockerell of the University of Colorado for the loan of types from the university collections; and to Dr. A. L. Melander of the College of the City of New York for the loan of material.

Early in this investigation it became apparent that it would be advisable to study the amber Syrphidae in the university museum at Konigsberg. This was made possible by a grant from the Penrose Fund of the American Philosophical Society. Important collections containing rare living genera were studied in Vienna, Berlin, Amsterdam and London. Additional amber material was obtained in two institutions in Berlin, and amber and other material studied from the British Museum. I wish especially to thank Dr. K. Andree, Director of the Geologisch-palaontologisches Institut und Bernsteinsammlung der Albertus-Universität of Konigsberg and his associate Dr. Otto Pratje for kindnesses to me during my visit there and for loan of the material. I wish also to thank the following individuals who materially aided this study by the loan of specimens: Dr. W. Janensch of the Geologisch-Palaontologisches Institut and Museum der Universität Berlin; Dr. J. V. Wumdorf, Preussische Geologische Landesanstalt in Berlin; Mr. T. H. Withers, Department of Geology, British Museum of Natural History; and Dr. G. D. H. Carpenter, University Museum of Oxford University, England.

PREVIOUS WORK ON FOSSIL SYRPHIDAE

The earliest reference to a fossil Syrphid fly in the literature is of an unidentified species of *Microdon* listed by Serres in 1829 from the beds of Aix in Provence, France. In 1837 Germar studied the "carbonum fossils" from the Oligocene of Bonn, including one poorly preserved Syrphid, which he called *Helophilus? primarius*. Brodie (1845–47) is erroneously credited by compilers with having figured a Syrphid, which Giebel later (1856) described under the family Muscidae. Weyenberg (1869) described a Syrphid (*Cheilosia dubia*) which must unquestionably be deleted from the lists, since it is totally unrecognizable.

In the middle of the last century three workers devoted much time

to a serious study of fossil insects. The first of these was Hope, who in 1845–47 listed many interesting dipterous genera from Aix in Provence in France, including a specimen of *Rhingia* which has reposed in the Hope collection unnoticed for ninety years. This was recently loaned to me by Dr. G. D. H. Carpenter of the University Museum of Oxford. Oswald Heer, who published in 1849 his "Die Insektenfauna der Tertiargebilde von Oeningen and Radoboj in Croatiens," was the second student of the century to give much attention to fossil insects. Herman Loew in 1850 was the first distinguished dipterist to become interested in fossil Syrphidae. He described no species, but mentioned seven genera from Baltic amber. I was fortunate in finding the material Loew studied in the British Museum, though the *Volucella*, which Loew mentioned and which was the most interesting genus among his material, was missing. It is possible that he had the species I describe below as *Ptilocephala volucelloides* (subfamily Volucellinae) from the collection of the University of Konigsberg. Carl von Heyden (1867) named several species of Syrphids which were taken from the beds of Rott (Siebengebirge in Rheinland). I found one of his types at the British Museum.

In 1877 Samuel Scudder began his notable investigations of the fossil insects of the Green River Shales of Wyoming in this country. These studies appeared at irregular intervals, until as late as 1890, after which Scudder mentions no more Syrphids. Dr. Samuel Williston, about this time, examined certain other specimens of Scudder's and tentatively assigned them to genera. I have confirmed his conclusions in all cases where he mentioned catalogue numbers that have made possible the tracing of the material he handled.

Finally, mention should be made of the work of Professor T. D. A. Cockerell, pioneer enthusiast in the modern study of fossil insects, who has added more species to the list of fossil Syrphidae than any previous writer.

SOURCES OF PRESENT MATERIAL

The specimens upon which this study of fossil Syrphid flies is based are from ten different deposits, including Baltic amber. The Syrphidae preserved in rock are from several collections, the most important of which is in the Museum of Comparative Zoölogy, containing the Scudder collection and the specimens mentioned and discussed by Williston in his 'Synopsis' (1886). All but one of Scudder's five species have been studied. His specimens were from the Green River shales

and excepting one species in the National Museum, they are contained in the collections of the Museum of Comparative Zoölogy. Specimens in the American Museum have been examined and I have likewise been fortunate in studying the types of Dr. Cockerell's fossil Syrphidae, loaned by the University of Colorado Museum. It has therefore been possible for me to see most of the Syrphids from North America. Only one of the fifteen genera and only four of the twenty-five species have not been seen at the time of writing. There are almost twice as many species known from the North American beds as from all of the remaining beds of Europe, not including the specimens from amber.

I have been able to locate but few of the types of fossil Syrphidae from European beds; fortunately, most of these species were described by two men, Heer and Heyden, and they have been carefully illustrated. These illustrations are not of the desirable type, but it is clear that the fossils belong to the subfamily Syrphinae and to the group *Syrphus* in the broad sense. For phylogenetic analysis this can serve my needs. I have studied the types of *Merodon germari* Heyden from Rott (British Museum of Natural History); *Platycheirus infumatus* Heer from Radoboj (British Museum of Natural History); and *Rhingia* Hope from Aix (Hope Museum, Oxford University).

Of the nine Baltic amber genera mentioned in literature, only seven received specific names and therefore numbers, which made them traceable. Of these seven genera I have been able to study five. One of the two named specimens missing is believed to have been mislaid at the University of Konigsberg with the Hymenoptera, having been returned with this family by Dr. Cockerell. The fullest facilities were extended to me at Konigsberg and I was allowed to examine their collection of amber Diptera, which included some ten or twelve thousand specimens and which yielded a total of one hundred and nineteen specimens of Syrphids. Several other collections of amber have yielded new species or old types, chiefly those of the Geologisch-Palaontologisches Institut und Museum der Universitât Berlin, the Preussische Geologische Landesanstalt Museum Berlin, and the British Museum of Natural History. All of these amber collections have furnished a total of twenty new species, making a total of nineteen genera and subgenera and twenty-nine species known from amber.

THE GEOLOGICAL DISTRIBUTION OF THE SYRPHIDAE

Eleven formations, including Baltic amber, have yielded Syrphids; seven of these are in Europe and three are in the United States.

(1) Florissant Shales, Colorado (Miocene)

These shales have yielded an enormous number of beautiful fossils, among which are species of Syrphidae. The fossiliferous character of these shales was discovered by A. C. Peale in 1876. Carpenter (1930) states that only the upper part of the formation bears fossils, and that the preservation was due to the entombing action of volcanic silt and ash. The flora associated with these insects was composed largely of deciduous shrubs and trees and was similar in many ways to that of the upper Cretaceous, with the addition of such genera as *Alnus, Aster, Fraxinus, Populus, Rosa, Rhus, Salix* and *Ulmus.* These are all modern genera of plants and a certain number of well developed flowers are present. *Rosa, Rhus,* and *Salix* present today quite an attraction to Syrphid flies. The climate must have been warm, for magnolias were present. Previous writers have noted the presence of tropical elements in the Florissant fauna, such as *Glossina.*

(2) Creede Shales, Colorado (Miocene)

This rock seems to be a mixture of very fine sand and clay; it had the same origin as the Florissant shales. Only one Syrphid has been taken from this bed thus far. The flora has not yet been fully studied.

(3) Green River Shales, Colorado, Wyoming, Utah (Eocene)

This is the only Eocene bed in this country which has yielded Syrphid flies. It extends over portions of Colorado, Wyoming, and Utah, and has yielded nine species of Syrphidae. The biota includes a very considerable flora and a large number of insects, as well as fish. Although originally regarded as a gigantic lake bed covering thousands of square miles, the deposit is now thought to have been formed by series of numerous small lakes, which were at times saline rather than fresh (Cockerell 1926, Carpenter 1930). As far as can be ascertained, the climate was hot and probably humid. Palms are common in the shales, as well as Fulgorids, which are not abundant in temperate regions.

(4) Oeningen Shales, Germany (Miocene)

This is an old and famous collecting ground for fossil insects, consisting of mixed marls and limestone, mostly thinly laminated; and considered to have been spring-fed lake deposits. Two quarries have

yielded most of the specimens, which include two Syrphid flies. Heer (1849) made a very careful study of the Oeningen fossils.

(5) Marls of Radoboj, Croatia (Miocene)

These deposits are just east of the top of the Adriatic Sea. Unger was the first to give serious attention to their fossils. His work was followed by that of von Charpentier and by that of Heer in 1865. A few Syrphids are included among the three hundred insects described.

(6) Lignite Beds of Rott (Siebengebirge at Bonn, Germany), (Oligocene)

Three species of Syrphidae have been described from these beds. One of these belongs to *Merodon*, a genus which prefers warm climates and whose home is now upon the Mediterranean shores; it confirms the conclusions drawn respecting the climate in Miocene times, which were based upon other species from these beds (Goss, 1878). The authority upon the insects of this region was Carl von Heyden.

(7) Beds of Aix in Provence, France (Oligocene)

This formation, once considered Eocene but now known to be upper Oligocene, is stated by Goss (1878) to include the richest beds of its period on the continent. Marcel de Serres (1829), who was the first to discover insects here, found some eight genera, including two Syrphids, both of great interest. Among later students were Murchison and Lyell (1829); Bonn (1851–6) and the Reverend F. W. Hope (1845–47). In studying the climate in which the biota existed, Saporta (1872) found the flora to be even more southerly than the fauna, a peculiarity which we have noticed for other geological formations in which insects occur. *Microdon* which occurs in these beds is a characteristically tropical genus.

(8) Baltic Amber, Germany (Oligocene)

The Baltic amber is one of our richest sources of fossil insects, and I have been able to study more than a hundred and fifty Syrphid inclusions. Several writers have discussed the environment in which the insects originally lived; the abundance of Psychodidae, Tipulidae, Mycetophilidae, Empididae, and bark-loving Dolichopodids indicate a densely shaded environment.

(9–11) Miscellaneous Occurrences of Fossil Syrphids

One species of a Syrphid was described by Foerster (1891) from Brunstaat in Alsace (middle Oligocene), and another by Stackelberg (1925) from the Miocene of Caucasia. In addition, a Syrphid has been mentioned by Theobald (1934) from Camoins: (Oligocene).

SYSTEMATIC DESCRIPTIONS

Subfamily SYRPHINAE

Syrphus is geologically the oldest Syrphid genus, as far as known. This early occurrence of *Syrphus* agrees with the present concept as to the more generalized of the fourteen subfamilies, which places Syrphinae at the bottom. Three species of the genus are known from the Eocene and all of them certainly appear to belong properly within that genus, at least in the wide sense. It is impossible to determine into which of the existing subgenera they should go, if indeed to any of them.

Pongracz re-allocated two species formerly described in *Syrphus* to the genus *Platycheirus*. He does so on the basis of the wings, but I believe that this must remain a guess on his part, however shrewd, as does my own somewhat conjectural assignment of one species (*persistens*) to *Platycheirus*, until the fore legs are better known from other specimens. *Platycheirus* rests solely on the dilation of the fore tibiae and tarsi in the male. I assign my species (*persistens*) to *Platycheirus* on the form of the tarsi and also upon the basis of the abdominal pattern, which is not always reliable, but sometimes a good indication. Its tarsi appear to be modified. The abdominal pattern is very constant in many Syrphid genera, and in *persistens* it is certainly more like that of *Platycheirus* than of *Syrphus*. The species (*quadrata*) Scudder described as a *Milesia* is obviously out of place and I assign it provisionally to *Asarcina*, an existing African genus. It surely belongs in the Syrphinae, and the pattern is very much like that of *Asarcina* today.

These are the only genera in this subfamily represented by fossils. It is therefore possible that much the greater part of the Recent genera in Syrphinae are merely subgenera and have evolved in somewhat more recent times.

Syrphus aphidopsidis Cockerell

Plate 5, fig. 25

Ann. Ent. Soc. Amer., **2**: 253, fig. 4. (1909)

Female. Length 14.0 mm.; length of wing 9.2 mm. *Head:* is broadly rounded, and the curvature behind suggests that the head was narrowly concave in posterior vertical profile. The head is unusually well preserved, each facet visible, though parts of the surface are cracked away. Front broad, about two-fifths of the head width from the vertical aspect. *Thorax:* and scutellum quite dark and black, the rim of the latter appears more or less truncate apically, but was probably semicircular instead, since the pigment of the abdomen was as dense and dark as that of the scutellum; the demarcation is indistinct. *Abdomen:* of this species is elongate and there is a pattern of transverse bands completely interrupted in the middle but least interrupted on the third segment; all of them are, therefore, broken up into spots. The bands are basal in position on the segments, and in extent along the lateral margin occupy about two-fifths of the length of the segments. Those on the fifth segment very much smaller. These spots are roughly triangular in shape, with their posteromedial borders somewhat convex. Abdominal pile setaceous. *Legs:* very little of the legs shows in the specimen; the hind femora were short and a little thickened, and their base apparently pale in color. *Wings:* are noteworthy for the heavy vena spuria and the exceedingly sigmoid apical cross vein, joining the third vein barely at right angles, some little way from the tip of the wing. Third vein ending with the costa quite at the tip of the wing.

The following description was taken from the obverse, which is in the British Museum of Natural History:

Head: eyes dichoptic with posterior margins broadly rounded, the facets not enlarged above. Front long, with a dark colored lunule above the antennal base; first and second antennal joints short, subequal, the third about as long as second, but larger and deeper; round in shape. The arista slender, basally thickened, about as long as the antennae. The ocelli do not show. *Thorax:* is confused by the presence of legs, the specimen being preserved by a ventral posterior. Details cannot be satisfactorily ascertained. *Abdomen:* the abdominal sternites appear as dark patches on the third, fourth and fifth segments, with bristle pairs short and sharp, all directed posteriorly. These begin as a narrow strip on the second segment, widened to a truncated wedge on third and becomes a broad trapezoidal area on the fourth segment.

Legs: hind femora rather thick, but uniformly so; thick for a member of the genus *Syrphus*; covered on their basal and lateral surfaces for the whole length with short sharp bristles, which are not setigerous. Hind tibiae slightly curved and also rather thickly covered with similar, short, thick bristles. *Wings:* only the base of the costa of the wing with spinules or short bristles. The remainder are too minute to be readily observed. Costa ending at tip of wing just past the union with the third longitudinal vein. Third longitudinal vein straight.

Locality: Florissant, Colorado. Horizon: Miocene.

Type: reverse in University of Colorado Museum (No. 8566); obverse in British Museum.

Syrphus willistoni Cockerell

Plate 3, fig. A, C; Plate 4, fig. 6, 15

Bull. Amer. Mus. Nat. Hist., **26**: 9. Pl. I. (1909)

Male and female. Length 11.3–6.4 mm.; abdomen and scutellum 6.8–3.8 mm.; wing length 8.2–5.3 mm.; abdominal width 3.2–2.0 mm.; these measurements are taken from a series of fourteen specimens, the numbers of which are noted below.

The agreement of the respective parts is remarkably good. It is not unusual to find a hundred percent size variation or over in Syrphids.

Head: little detail shows, although on occasional patches facets can be seen. I am able to determine that the supraocular facets were enlarged. Antennae short. The third joint appears to be about one and one-half times as long as wide, to be markedly rounded off dorsally and distally so as to come to an obtuse point ventrally. The arista is slightly thickened and held erect. It is but little longer than the third joint. I can make out setae upon the end of the first joint, but not upon the second, though they were undoubtedly present. In the female, the eyes are separated at vertex by about .5 mm. and thence diverge gradually down the front. *Thorax:* dark in color. The pile is not apparent; it was presumably delicate. The scutellum is two and a fifth times as wide as long with even rim and no trace of bristles or pile. *Abdomen:* five segments and the hypopygium of the male are visible. The first is practically covered by the scutellum; the second, third and fourth are nearly equal in length and not greatly differing in width. The second and fourth about the same, the third being slightly wider. The fifth is half the length of the fourth and is narrower. Second, third and fourth segments marked with a large yellow spot on each side, reaching the margin in at least two-thirds of its full length,

and separated in the middle, by a complete median band, which is parallel-sided, and progressively wider from fourth to second segment. The post median corner of each spot is rounded, the anterior median corners practically square. The fifth segment is clear anteriorly, but in the type specimen there is abundant indication that the posterior half was dark. The whole abdomen with the exception of the anterior part of the second segment, where it thins considerably, is covered with abundant, beautifully regular, short, but not unusually short, stiff, sharp tipped hairs. They grow more numerous on the fifth segment. It might be described as stiff pile. Number 3955 is an exception in that the first pair of spots do not reach the margin. Numbers 3961, 3968, 3966 and 3963 show an extra wide abdomen with consequent alteration in shape of the spots. In view of varying pressures, I do not believe these differences are important specifically. *Legs:* unfortunately little is shown. The tarsi appear to be enlarged in No. 3954. The hind femora are slightly thickened. *Wings:* of the typical *Syrphus* type. The third longitudinal vein is ever so barely sinuous. The first longitudinal vein again approaches the costa insensibly, but there is no question of the submarginal cell; it is open. The spurious vein is quite distinct and runs nearly to the union of fourth longitudinal vein and postical cross vein. The second longitudinal vein joins costa at an angle of about fifty-five degrees. The costa and third longitudinal vein end together at tip of wing.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: Amer. Mus. Nat. Hist. Allotype: No. 3954 M.C.Z. Additional specimens: Numbers 3955, 3956, 3957, 3958, 3959, 3960, 3961, 3963, 3964, 3965, 3966, 3967, 3968; all Museum of Comparative Zoölogy.

Handsome flies with large clear fenestra, or spots upon the abdomen, which were doubtless yellow in life. These spots are almost rectangular. The species belongs to that large class of fossil *Syrphus* with the bands medially divided.

Syrphus hendersoni James

Canad. Ent., **64**: 265 fig. (1932)

This species is unfortunately based merely upon an abdomen. The pattern of this abdomen is striking, with four segments and perhaps a fifth visible. The outline of the abdomen is broad and the segments are somewhat detached from one another. The length is about half again as long as the width. The spots of the first segment are small,

oval, well-removed from any of the borders of the segment, widely separated in the middle and somewhat pointed towards the anterio-lateral corner. Those of the third segment represent narrow lateral bands continuous basally only for a short distance beginning at the margin, and strongly bulging posteriorly in somewhat abrupt fashion after having run with somewhat uniform width for almost half their total width. The medial portion of these spots might be looked upon as separate, large, rounded medio-basally squared spots which are confluent with the narrow basal and lateral spots. Spots of the fourth segment similar except that the medial rounded portion is smaller, more widely separated and the neck representing the confluence is narrower. The pile of the abdomen is short and delicate, but is a little stiffer in each posterior lateral corner along the posterior border for a short distance.

Locality: Green River, Colorado, Station 25 Kimball Creek. Horizon: Eocene.

Holotype: No. 15652. University of Colorado Museum.

Contrary to the remarks of James, the pattern of this species is not greatly different from that of certain species of western *Syrphus*, such as *amalopis* O. S.

Syrphus platychiralis spec. nov.

Sex indeterminate. Length for the two specimens 7.0 mm. and 8.0 mm.; length of scutellum and abdomen 4.4 mm. and 5.0 mm.; for wing 5.6 mm. and 5.8 mm.; width of abdomen 1.3 mm. and 1.6 mm. *Head:* very little detail shows. The antennae were short, with large third joint and a moderately short arista, remarkably thickened, gradually and evenly, on the basal half. The third appears to have been obtusely pointed ventro-distally. *Thorax:* dark in color. No detail of pile apparent. Scutellum large, one and one-fifth times as wide as long, and somewhat squared in outline. Margin simple. *Abdomen:* slender in form, pale in color with dark posterior cross bands on the segments and each pale band interrupted or subinterrupted medially. The second, third, and fourth segments are nearly equal in length. The fifth is nearly as long as the fourth, but narrower. Hypopygium quite visible and rounded. The median band is widest and complete on the second segment, on the third it is quite narrow and appears to dwindle so it barely reaches the anterior border. The same is true of the fourth segment. The following segment clear. Pile stiff, bristle-like, much as in *Syrphus willistoni* Cockerell, but on the posterior seg-

ments it fails to become condensed and superabundant. *Legs:* hind femora decidedly strengthened without being greatly enlarged; about one and a half times or more as thick as the hind tibiae. Both are everywhere covered with appressed, close-set, short bristle-like pile, running in the appropriate direction. The varying vortices of the pile are easily discernible and it is remarkable that it is continuously of the short stiff type. Hind femora and tibiae dark; the former appear to have been pale basally. *Wings:* typically *Syrphus*-like. I am unable to detect significant differences from those of *Syrphus willistoni* Cockerell, although the marginal cell appears to be more distinctively open.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3926. M.C.Z. (Scudder collection). Paratype: No. 3927. M.C.Z. (Scudder collection).

This species, while close to *Syrphus willistoni*, appears distinct in its more slender abdomen, semi-interrupted bands of the abdomen, and differences in pile.

Syrphus carpenteri spec. nov.

Plate 1, fig. B; Text-figure 1.

Female. Length 5.7 mm. (6.2 mm. including antennae); head 1.5 mm.; abdomen and scutellum 2.8 mm.; wing 4.6 mm.; width of wing 1.8 mm. *Head:* presented from the dorsal aspect, the eyes are widely separated, almost every facet standing out clearly. The ocelli are very clear, forming an obtuse triangle, the posterior pair being one and a half times farther apart than each of them from the anterior one. Upper anterior facets slightly enlarged. The antennae are longer than broad and appear slender, but since they are not large this does not make them appear long. Third joint about equal to first and second in length; perhaps a little shorter. *Thorax:* dark in color—no pile shown. Scutellum short, about two and fifth times as broad as long; evenly rounded with simple margin and no trace of bristles. *Abdomen:* four segments and a trace of fifth visible. First segment dark in color. Remainder of the abdomen with large, quadrate, pale spots, about one fifth of each segment being devoted to dark posterior segmental border, and a progressively narrower median dark stripe, narrower from fourth to second, where it is quite narrow and is about half as wide as the posterior border of that segment. The median band of the fourth segment is three times as wide as the median band of the second segment. The median stripe reaches the anterior border of each seg-

ment and the lateral borders of each segment are dark, though very narrowly so in the middle of the second segment. The basi-median corner of the spots is only slightly convex and the anterior median corners of second and third quite square; on the fourth segment the median stripe widens as it approaches the anterior border of the segment. The abdomen of this species is thus seen to be rather wide, with unusually large subquadrate spots upon it. But the size of the fly is small. Abdomen covered with short thick bristly hair, but not noticeably thicker on the posterior segments. *Legs:* but little shows. Hind femora slightly thickened. *Wings:* well preserved. Curious, short and rather broad. Costa microsetose; spurious vein very distinct, reaching nearly to fusion of fourth longitudinal vein and postical cross vein. Third longitudinal vein nearly straight, what curve it has is not a sinuosity, but a very low gentle arch over its whole length. It joins costa at tip of wing. Costa stops just a little beyond. Marginal cell broadly open and second longitudinal vein joins costa at an angle of about thirty to thirty-five degrees. First longitudinal vein unusually heavy. Subapical cross vein not sinuous, nor sigmoid, but angulate, a trace of spur directed inward.

Fig. 1

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3928. M.C.Z. (Scudder collection).

I take great pleasure in naming this interesting species for Dr. Carpenter, to whom I owe much for his encouragement in the study of these flies.

Syrphus eocenicus Cockerell

Proc. U. S. Nat. Mus., **64**: 7. Pl. 2., fig. 2. (1924)

"Robust, 12 mm. long; abdomen 7 mm. long and 4.5 mm. wide; head and thorax black, the scutellum not pallid as in modern *Syrphus*, but appearing a shade lighter than the abdominal bands; abdomen with very well-defined markings, the three broad light bands all interrupted by a narrow median band, somewhat broader, but still very narrow, on first segment; the light bands reach the extreme margins, and of approximately equal width, the first however conspicuously wider mesally than the others, the upper edge of the second dark band presenting a double curve on each side; the other dark bands also have a double curve on each side, but not sufficiently to make the light bands appear arcuate; the third light band is much wider at the sides than mesally; there is a fourth light band, broadly interrupted mesally, its inner ends pointed. Wings not preserved."

Locality: Green River, Wyoming (Station above head of the Ute trail above Sellers Ranch, Roan Mountains, Colo., July 1922). Horizon: Eocene.

Holotype: 69179 U.S.N.M. (Not seen).

"A beautiful specimen, although lacking the wings. It appears to be close to *S. umbellatorum* Schiner, but considerably larger, with dark scutellum. It is much larger than *S. lithaphidis* Cockerell, found fossil in the Eocene of Cathedral Bluffs."

The above description is that of Cockerell. On my visit to the National Museum the type could not be located. This is a clearly marked and valid species, which should be easily recognized.

Syrphus lithaphidis Cockerell

Proc. U. S. Nat. Mus., **57**: 253. (1921)

"Length, about 8.2 mm.; head and thorax 4 mm.; length of wing 6.8 mm. Head and thorax fuscous (doubtless black in life); wings hyaline; abdomen pallid with broad dark bands on hand margins of segments, and a broad dark median band, evanescent on the apical half. Venation in general as in modern *Syrphus*, except that the subcostal cell is not nearly so slenderly tapering at the apex, the end of the first vein being somewhat like that figured by Williston for *Paragus tibialis*, though this does not agree well with an actual specimen of *P. tibialis* before me. There is a distinct, though not dark cloud filling the apical part of the subcostal cell, as in modern *Syrphus*. The wing

measurements are as follows: end of auxiliary vein to end of first about 1. 6 submarginal cell on first basal about .8 mm.; last posterior on second basal about .32 mm.; tip of anal to wing margin about .24 mm. The general form and appearance entirely agree with *Syrphus*.

Locality: "Cathedral Bluffs South of Little Tommies Draw at a point where samples were taken. Colorado. (Winchester 17–5)." Horizon: Eocene.

Holotype: 66585 U.S.N.M. (Not seen).

"In the markings of the abdomen, this closely resembles *S. willistoni* Cockerell."

The description of this species is very inadequate and would probably not enable its recognition, although there is no doubt that it is related to *Syrphus willistoni*. The type could not be found.

Syrphus euphemus Heyden

Palaeontographica, **17**: 262. Pl. 45, fig. 29 (1850)

The description given by the author presents the following points of interest and value.

Length 7 mm. *Head:* large, posteriorly truncate, strongly bulging towards the front. The eyes are holoptic and large covering the entire upper surface of the head. *Thorax:* is much longer than broad, and broadest posteriorly; the scutellum is large, its margin rounded and entire. The author states that upon head, thorax and scutellum one can clearly see a light greenish-brassy color. *Abdomen:* has five segments; it was somewhat longer than the thorax and broadest in the middle; the three first segments were about equally long, the fourth shorter, the fifth smaller and posteriorly rounded. The color of the abdomen was chiefly yellow; upon the second, third and fourth segments and perhaps the first there was a rather broad, sharply bordered black fascia; all the segments have likewise a black, somewhat smaller, sharply bordered posterior margin. *Wings:* the first longitudinal vein was branched. The author states that the third longitudinal vein arose from the second beneath the branch of the first with a rather strong deflection near the base of the wing and went without branching to the tip of the wing. He notes the presence of the usual oblique cross vein through which the vena spuria runs parallel to the fourth longitudinal vein. The first posterior marginal cell is closed and moderately stalked.

Locality: Rott, Siebengebirge at Bonn, Germany. Horizon: Oligocene.

Type: One male originally in the Krantz collection. I was not able to locate it.

The species may be known by the narrow, black margins on the posterior borders of the abdominal segments and by the broad, complete, medial fascia which divides the pale markings in half.

Syrphus freyeri Heer

Ins. Oen., **2**: 244. Pl. 17. figs. 12, 12a, 12b. (1849)

The description and illustration given by the author present the following points of interest and value.

Length without head 6.5 mm.; of thorax 2.5 mm.; its breadth 3.6 mm.; of abdomen 4 mm.; its breadth 2 mm.; of wing 7.5 mm. The head is wanting. The thorax is oval and shining black; the scutellum similarly colored. The wings project out over the abdomen and their venation is clear and similar to *Syrphus*. The abdomen is elongate oval and shining coal black; the first segment cannot be discerned; the second is longer than the third, the fourth much shorter, the fifth still shorter. Each segment excepting the first has on each side a light colored spot. They approach one another on the dorsum as far as the black line and thus form an unbroken fascia. On the second segment are two almost triangular spots whose more acute angle lies somewhat medialward; upon the second and third segments the large spots extend to the basal margins of the segments. These spots widen towards the middle of the abdominal segments and leave their posterior margins arcuate. The fourth pair of spots is much smaller, they are oval and lie upon the short fifth segment. The legs are not sufficiently well preserved to furnish data. The wings project out over the abdomen and their venation is clear and similar to *Syrphus*.

Locality: Radoboj, Hungary. Horizon: Miocene.

Type: Two specimens in the k.k. montan. Museum zu Wien. Heer says that one specimen is contained upon a slab with other flies such as *Oedipoda medlanosticta*, *Limnobia vetusta*, etc. I was not able to locate the types.

Heer says that the fly is closest related to *Melanostoma mellinum*, which has a widespread range over the northern hemisphere. It agrees in size, in the glossy, dark colored thorax and spotted maculation of the abdomen with the male of *M. mellinum*. It is unlike that species in the almost triangular spots of the second abdominal segments, in

the spots of the fifth segment. He compares it to *Platycheirus scutatus* Meig., which however has quadrangular, pale abdominal spots. This species may be easily recognized by the large, round spots on each side of the third and fourth segments, and the similar pair of subtriangular spots on the second segment.

Syrphus geminatus Heer

Ins. Oen., **2**: 245. Pl. 17, fig. 13. (1849)

Length of abdomen 5 mm.; breadth 3 mm. *Head:* and part of the thorax are destroyed, only the posterior part of the latter is preserved; it appears to have been black; likewise the scutellum. *Abdomen:* elongate, oval; the first segment very short and dark, the following three more or less the same length; they are entirely light colored and were in life probably white or light yellow. The anterior border of each segment has a clearly contrasted, narrow, linear crossband of black. The posterior border of each segment is light colored, but immediately before that there is a second linear, black crossband; this band lies next to the anterior one of the following segment and borders the yellow posterior border of each segment. Thus there are two black cross lines that closely approach one another and which encloses a light one band formed by the posterior margin of the segment. The fifth segment is distinctly smaller toward the end and on the posterior margin only a dark spot is visible. The very short sixth segment appears to have been light colored. The *wings* are for the most part destroyed; yet on the left wing enough of the veins is preserved so that one can recognize its position in the genus *Syrphus*.

It belongs near the group of *Syrphus balteatus* F. (Europe), *S. nectarinus* Wied. (China) and *S. alternans* Macq. (from Coromandel), differing, however, from all of these by the fact that the middle of the first and second segments are not black, and that always each segment on the posterior border is light; the anterior border, however, is black, while in that one the anterior border is yellow, on the posterior border black. (Rewritten from original.)

This species is easily recognized by the very narrow complete black bands just before the posterior margin of the second, third and fourth segments, as well as similar ones on the anterior margins of the third, fourth and fifth segments, together with the fact that none of these bands are interrupted.

Locality: Radoboj, Hungary. Horizon: Miocene.

Types: two specimens in the K. K. Montan. Museum at Vienna. In my visit to the Museum, which Heer states is the repository for these specimens, I was not able to locate the types.

Syrphus reciprocus Foerster

Abh. Geol. Spezialk. Els., **3**, no. (5): 486. Pl. 14, fig. 28. (1891)

Female. Whole length 6.5 mm. Head: the anterior side of the head with its proboscis is turned backwards, due to pressure. The large eyes do not touch, so this specimen is apparently a female. Only the basal segment of the antennae is preserved. *Abdomen:* this shows principally the ventral side with the sockets of the legs; on the dorsum the large middle segment with the scutellum is seen from the side. It is 4 mm. long and 2 mm. broad and consists of six segments. *Legs:* only a few remnants are preserved. (Rewritten from original.)

Locality: Brunnstaat, Alsace. Horizon: Middle Oligocene.

Type: I have not been able to find the type.

Foerster states that *Syrphus euphemus* Heyden from Rott has the same size, but is more slender. From the figure it seems characterized by a wholly pale abdomen.

Platycheirus haidingeri Heer

Heer, Ins. Oen., **2**: 243 Pl. 17, fig. 11 (1849). Pongracz, Ann. Mus. Nat. Hungarici, **25**: 188 (1928)

Male. Length 13 mm.; length of wings 12 mm.; length of abdomen 8 mm.; width of abdomen 4 mm. *Head:* largely destroyed, but more or less hemispherical. Eye facets plainly distinct, somewhat enlarged above. Head appears to have been a little wider than humeri. Antennae do not show. *Thorax:* dark in color, with evidence of some long hairs on the side. Scutellum small, margin evenly rounded, about one and one-half times as wide as long. *Abdomen:* broad, quite flat, with distinctly emarginate sides and sparse, quite fine setigerous or bristle-like pile, that reaches over the segmental margins, but which is not concentrated along the posterior margins. Pile appressed. Abdomen dark in color. Pattern apparently consisting of narrow lunules, meeting or practically meeting the mid-line but not reaching the lateral margin. Present on second and third segments. Hypopygium present. *Legs:* details of the legs are not plain, except that on what appears to have been the mid-femora, the bristles are sparse, long, slender. *Wings:* well preserved, on both sides the basal one-half with very

sharp outwardly depressed short bristles. Third longitudinal vein turning down slightly opposite the middle of the subapical cross vein. Thus very slightly convex instead of concave. Submarginal cell open, color of veins brown, pubescence of wings thick, and well preserved. Spurious vein conspicuous, very apparently not heavily chitinized. Posterior margin of wing with distinct micro-nodules on margin of wing.

Locality: Oeningen, Germany. Horizon: Miocene.

Type: I have no information as to the place of deposit of the type. I studied a specimen in the British Museum which may have been the type and on which my description is based.

Platycheirus persistens Hull

Plate 4, fig. 4–5

Psyche, **45**: 116. Fig. 3 (1938)

Male. Length 10 mm.; of abdomen and scutellum 6 mm.; of wing 7.2 mm.; second specimen, length 10; thorax and abdomen 6.2 mm.; of wing 3.8 mm. *Head:* hemispherical, obviously narrower than thorax. Eyes narrowly dichoptic. Face dark in color. No details of antennae visible. *Thorax:* dark, though very little pigment is preserved, and no details of pile can be seen. Scutellum semicircular, the margin evenly convex, the width about one and three fourths greater than the length. *Abdomen:* slender, the sides not quite parallel, but slightly convex, leaving the middle segments barely wider. The first segment juts beyond the rim of the scutellum by a fifth the scutellum's length. Second and third segments of nearly equal length, the former longer. Fourth segment slightly shorter than third. Fifth segment two-fifths as long as the preceding one. Hypopygium prominent and smoothly rounded. The segments are marked with brown. The posterior two-fifths of the second segment with a median wedge, pointing to and reaching the anterior border, and similar pattern on the two succeeding segments, the brown of the posterior border on the fourth segment occupying nearly the whole of the posterior half. The fifth segment is clear. *Legs:* slender. For the most part, they are not well preserved, but one pair of tarsi, apparently the left hind tarsi, are well preserved and shows decided expansion and thickening of the joints. *Wings:* poorly preserved.

Female. Specimen No. 3950 (3951) is without head. The wings are a little better preserved and show the third longitudinal vein and

costa ending quite beyond the tip of wing, though not nearly as much as in *Rhingia*. The abdominal pattern is quite similar; beyond the fact that the segments are slightly wider, I am unable to detect differences of importance. One whole hind leg (right) is preserved. The femora were slightly thickened one and two-fifths the width of tibiae and the tarsi were not dilated. The obverse is fragmentary and poor. Perhaps a trace of antennae appears upon it. The opposite hind tarsus is shown, the maculation is deceptive and the abdomen also appears disproportionately short and wide.

Locality: Creede, Colorado. Horizon: Miocene.

Holotype: No. 3949 M.C.Z. Allotype: No. 3950. M.C.Z. (obverse). Paratype: No. 3951. M.C.Z. (reverse). All are poorly preserved.

Platycheirus infumatus Heer

Heer, Ins. Oen. **2**: 246. Pl. 17, fig. 14. (1849). Pongracz, Ann. Mus. Nat. Hungarici, **25**: 190, fig. 53 (1928)

I give below an analysis of this fly drawn from the original description and the illustration.

Length: without head 7.5 mm.; of wings 7.5 mm. *Head:* in the illustration the head was missing. *Thorax:* largely destroyed, the scutellum unrecognizable. *Abdomen:* well preserved but he finds that the abdomen though slender and cylindrical does not have the necessary basal contraction which though slight is characteristic of the recent genus *Doros*. The second and third segments were of equal width; the former segment pale in color with a suggestion of a black middle line at the base. The third segment was quadrangular, black in color with in the middle a narrow, light colored cross band; the margins of this fascia were quite sharp and clear. The fourth segment is of the same size as the third, is light colored in the specimen with small black, posterior band. The fifth segment is much shorter and light and beyond there an indistinct, small, contrasting terminal segment that appears to have been darkly spotted upon the margin. The entire abdomen densely set with very fine pile. *Wings:* well preserved. Heer compares the species to *Syrphus* and *Doros*. He notes the presence of an anterior dark border upon the wing from vena scapularis to the wing tip, in which respect it is very suggestive of *Doros*. Heer found the venation to be typical of *Syrphus*.

This species should be recognizable upon the basis of the parallel-sided abdomen together with the brown wing border and the abdominal pattern. The posterior half of the fourth segment entirely black. It

is possible that this fly was an early type related to *Doros* which, though a small genus, seems to be at home in Europe.

Locality: Radoboj, Croatia. Horizon: Miocene.

Types: Heer states that there are two specimens, one of these upon the same piece of rock as *Formica occulata* and *Myrmica minutula.* I was not able to examine the types, but Pongracz redescribed this insect from a specimen in the Geologischen Bundesanstalt (Vienna).

Leucozona nigra spec. nov.

Plate 2, fig. B

Female. Length 9 mm.; length of wing 6.2 mm. *Head:* large, about as wide as thorax, hemispherical in shape, the antennae short, the third joint of only moderate size, short, a little longer than broad, the arista rather longer than the antennae and basally thickened. No details of either head or thoracic pile can be seen. *Thorax:* short and broad, about as broad as long, black in color. Scutellum semi-circular, at least twice as wide as long; dark. *Abdomen:* robust, flattened, and relatively broad. It is one and one-half times as long as wide and five segments are visible. It appears to have been almost uniformly black, but there is considerable evidence that the posterior half of the second segment bore a wide pale medially interrupted transverse band. There is a bare possibility that there were similarly light colored spots on the remaining segment but here the specimen has more of the appearance which might be expected if portions of the chitin had peeled away. There is an odd shiny luster or vitreus appearance upon the abdomen, thorax, and scutellum of this specimen which I have not noticed on other fossil flies. The pile of the abdomen, while not excessively long as in wooly flies, has the appearance of being longer than usual. *Legs:* no details of the legs are apparent. *Wings:* very little longer than the abdomen, beautifully preserved. Both the apical cross vein is confluent with the third vein some way before the tip at a right angle, and the preceding section of the third vein is slightly curved upward throughout its whole length. Vena spuria quite distinct. Small cross vein strongly oblique before the vena spuria and enters the discal cell a little past that point which corresponds to a third of the way from the base. The outward portion of the fourth vein which bends down to join the lower marginal cross vein is very strongly bent indeed, and this appears to be one of the principal characteristics of the wing. The marginal cell is open and there is a large quadrate spot in the middle of the anterior part of the wing.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: one female, coll. Am. Mus. Nat. Hist., No. 157a.

I think that there is no question of this fly being a member of *Leucozona*, though the abdomen is not quite so long as in modern species. The well preserved venation and the characteristic wing spot make this an especially interesting fly.

Asarcina quadrata Scudder

Plate 2, fig. D

Scudder, Bull. U. S. Geol. Surv. Terr., **4**: 752 (1878). Scudder, Tert. Ins., 557. Pl. 9, fig. 13 (*Milesia*) (1890). Williston, Syn. N. A. Syrph., 281 (1886)

Sex indeterminate. *Head:* large, nearly as broad as the thorax, the eyes large, the front quite large, prominent, half as broad as the head and about half as long as broad. The head and thorax while present show few details; they were black in color. *Thorax:* barely longer than wide and widest in the middle. *Abdomen:* well preserved and shows a characteristic pattern. It was oval, of about the same width as the thorax and its ratio of width to length is 9:13. The ratio of abdominal length to thoracic length (including scutellum) is 14:10. The abdomen was thin and flat, with the first segment black or brown and the remaining segments chiefly pale in color margined with narrow fascia and vittae of black or brown as follows: second segment barely over twice as wide as long, with a narrow, posterior, marginal black fascia; the segment is divided in the middle with a narrow black vitta that is barely wider at its apical end and connection with the posterior fascia. Anteriorly it expands just before it reaches the anterior border and sends a slender, bordering fascia part of the way towards each side of the base of the segment. The third segment has posterior black fascia of about the same width as the previous one; it is barely wider in the middle and there is no median vitta whatever; the remainder of the segment is pale. The fourth segment is quite similar in pattern to the third, the posterior fascia attenuated just before it reaches the posterior lateral corners. Fifth segment with only a faint trace of a narrow posterior fascia. The entire abdomen was thickly covered with short setaceus pile. *Wings:* while present show very few details. They were longer than the abdomen in a ratio of 14:20. Scudder states that the third longitudinal vein originates from the second in the middle of the wing, is very gently arcuate in its outer half and appears to terminate just above the tip of the wing. He states further that the fourth longi-

tudinal vein is united by an oblique cross-vein to the third very near the origin of the latter, the marginal vein simple with the fourth longitudinal vein bending down at its tip to meet it. I am not able to verify these details because of past efforts to clear the wing.

There is no question of the subfamily relationships of this species. It could not be a *Milesia* and the abdominal pattern is extremely close to that typical for the large Ethiopian and Asiatic group of flies known as *Asarcina*, which actually range into southern Europe. I think the narrow fascia and broad flat abdomen place it with reasonable certainty in that genus.

Locality: Green River, Wyoming. Horizon: Eocene.

Type (male): no. 14691 in the U. S. N. Museum. Examined by me in the original and from a photograph kindly furnished by Dr. E. A. Chapin.

The Subfamily CHEILOSINAE

There are sixteen genera of this subfamily occurring as fossils. Ten are extinct, and the majority of these are in the Baltic amber fauna only. This is, I believe, explained if one constructs a map to show the distribution of all Recent *Cheilosia*, for certainly in point of density of species in terms of land area scarcely any Syrphid genus exceeds *Cheilosia*. The genus is very abundant today in central Europe. There are only thirty-six Recent genera and subgenera known today in the Cheilosinae. Sixteen is also exactly the number of Recent Cheilosene genera and subgenera known today from Europe, and there are only nineteen from the United States, fifteen of which are the same as European ones. I cannot avoid the conclusion that the Eristalinae and the Volucellinae are now dominant groups, whereas formerly the Cheilosinae were better developed.

It is appropriate to mention here that the Baltic amber Cheilosinae are not quite like modern ones, though in a somewhat indefinite fashion, and that the *Myioleptas* (*valida* excepted) are certainly not strictly like the genotype (a European species).

Of these sixteen Cheilosine genera, possibly *Eoxylota* should go to the Xylotinae, though how we would enlarge the concept of the latter to hold it without danger to the former is not clear. I think we must regard *Eoxylota* and *Hemixylota* (Chilean Recent relative) together with the *Myioleptas* as definitely transitional between these two subfamilies. Since *Myiolepta*-like forms were so common in the Oligocene and since there are three such genera from the shales of the Eocene and

Miocene (*Archalia, Cacogaster, Xylotosyrphus*) and since one definite Oligocene Xylotinae genus is found (*Megaxylota*) it seems reasonable to conclude that we are witnessing in the array of Oligocene Syrphids the origin of the Xylotine subfamily, both in point of facial type and acquisition of megamorphic femora, femoral armament, and migration of the small cross vein of the wing. Early in these studies I was astonished to find many flies strongly favoring Xylotinae, but precluded from there by the basal position of the small cross vein. I was therefore particularly pleased to discover *Megaxylota* in the amber, a true member of the Xylotinae. A study of *Xylotosyrphus* will show that, though the wing has altered, the typical Xylotine pattern of the abdomen has remained practically unchanged for millions of years. These beautiful and exquisite tetramaculate species (*Xylota, Planes*) form some of the most interesting components of our present Syrphid fauna. Finally, there is a possibility that some present-day species of *Cheilosia* can satisfactorily be allocated to *Protorhingia*. Possibly I am wrong in assigning *Doliomyia* and *Palaeopipiza* to the Eumerinae as early foreshadowing types of the modern genus *Eumerus*. If I am, these two genera would return to the Cheilosinae.

Cheilosia ampla Scudder

Bull. U. S. Geol. Geogr. Surv. Terr., **4**: 753 (1878).

Sex indeterminate. Specimen No. 5160: length 5.8 mm.; abdomen and scutellum 3.2 mm.; of wing 5.8 mm. Specimen No. 5162: total length 3.9 mm. (minus head); abdomen and scutellum 2.7 mm.; wing missing. *Head:* no details. What I believe may be an antennae (third joint) appears nearly twice as long as broad, evenly rounded at tip. Arista wanting. *Thorax:* dark in color, covered with fairly long stiff bristly pile, but none of the exceedingly long stiff macrochaetae. Scutellum evenly rounded, its margin simple, with a few bristles; its width two and a third times as great as its length, the curvature perfectly gradual, so that there is no suggestion of squareness. *Abdomen:* five visible segments and what appears to have been male genitalia. The scutellum covers about one-half the length of the first segment. Abdomen short and broad, about one and a half times as long as broad. Second, third, and fourth segments about equal in length, the fourth a little narrower, and the fifth much narrower and short, about one-third as long as the preceding segment. The abdomen is pale. If it was once pigmented it has disappeared from all except a narrow well-marked posterior border on the second, third, and fourth seg-

ments, which border is about one tenth the length of the segment in width. Abdomen covered with very fine delicate fairly long pile. *Legs:* hind femora slightly thickened; hind tibiae about two-thirds as thick as hind femora, and noticeably bowed or arched. Hind basi tarsi long, about two-fifths as long as hind tibiae and at least as long as remaining tarsal joints. All the legs covered with a conspicuous double row of stiff, dark spinules irregularly placed. *Wings:* poorly preserved. Surface villose; costa microsetose. Third longitudinal vein nearly straight with a very slight convexity towards the front, covering its length. Marginal cell widely open. The second longitudinal vein joining costa quite acutely, perhaps at an angle of twenty degrees. The anterior cross vein joins the discal cell quite proximally and both the subapical and discal cells are rather long and slender. (Redescribed from the holotype specimen.)

Locality: Green River, Wyoming. Horizon: Eocene.

Holotype: No. 5160; paratype No. 5162, Mus. Comp. Zoöl.

Scudder placed other specimens (5158, 5159, 5161) as *Cheilosia ampla,* and he placed number 5162, curiously, as *Cheilosia* sp. From a careful examination of this material, I conclude that number 5162 is *Cheilosia ampla* Scudder. Thus there are two specimens. No. 5161 I conclude to be a new species; its generic affinities will be discussed later. Number 5158 and 5159 are certainly indeterminate. They may just as well remain *Cheilosia ampla* ? Scudder. Both are from type locality.

I also place here provisionally a specimen from Dragon, Utah (Green River Shales) which has a markedly setigerous scutellum. Its abdomen corresponds perfectly with that of Scudder's specimen (number 5160). As that specimen shows traces of bristles on the scutellum, perhaps the others were lost. The Dragon specimen may remain here provisionally; I figure its scutellum. (Plate 4, fig. 13).

Cheilosia miocenica Cockerell

Plate 1, fig. C

Bull. Am. Mus. Nat. Hist., **26**: 72, fig. 5a, (1909)

Male. Length 10 mm.; length of wing 9 mm. *Head:* elongate, eyes especially elongate, and the posterior part broad right at the base, leaving (ventrally) the margin concave and fitting tightly over the thorax. Front convex, rounded, bulging, though nowise protuberant. Antennae present but concealed. Front and head dark in color. *Thorax:* dark; pilar details obscure. Some long delicate hairs at side

of mesonotum, just before the wing. Scutellum large, broad, more than twice as wide as long, the rim gently rounded. Squamae and fringe beautifully preserved; squamae not large, the fringe large, hairs of the fringe forked once. *Abdomen:* short, robust, flattened. Hypopygium large. Pile delicate and slender, not at all long. Color of abdomen dark brown, though lighter in the fossil than the thorax, due probably to thinness. Hypopygial and terminal pile not longer than the remaining. Hind femora short and quite slender, its pile short, no visible spines. *Wings:* costal spinules double-rowed, very sharp, rather long, tuberculate. Vena spuria present but quite faint. The radial sector vein arises by offset separation rather than furcation. The wings are considerably longer than the abdomen and the costa like that of *Rhingia* or *Protorhingia* is extensively carried down past the real end of the wing. In fact, it is quite possible that this species should be put in the genus *Protorhingia* (new genus). The marginal angle of the second posterior cell is a little bit rounded but has a spur and there is a very short section only to the fourth longitudinal vein before the origin of the apical cross vein. Both the marginal cross veins are close to the wing border and quite parallel to it, except as they are slightly bowed inward. The small cross vein slightly oblique above the vena spuria, is not quite one-third of the way from the base of the discal cell. The stigma was definitely darker in color. (Redescribed from type).

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 4444, University of Colorado Museum.

Cheilosia scudderi Cockerell and LeVeque

Plate I, Fig. A

Scudder, Tert. Ins., 561. Pl. 9, fig. 8. (1890) (Cheilosia sp.) Cockerell & LeVeque. American Naturalist, **45**: 357, fig. 4. (1931)

Female. Length 6.3 mm. (6.5 mm. with antennae); length of wing 7 mm. *Head:* small, much less wide than the thorax, elongate in form. Front narrowly separated. Occiput apparently well developed though not tumid. Antennae beautifully preserved, pale in color. The first joint quite short, third moderate in size, with a fringe of 17 or 18 short sharp bristles and a larger one on the outside. Third joint very large, half again as long as wide, evenly rounded at tip. Arista long, two and one-half times as long as antennae, thickened on basal half, nowhere sharply. Color of head dark. *Thorax:* dark, pile short, delicate, a little

longer on post calli. No macrochaetae. Scutellum dark, broad, short, rounded, pile as long as that of calli; no macrochaetae. *Abdomen:* round, barely longer than wide, widest at end of second segment. Pile delicate, not long, only moderately abundant, second segment dark, with a pair of subquadrate basal spots, wider than long, two-thirds as long as segment, completely interrupted in the middle, not reaching margin. A similar pair on base of third segment, less rectangular. Fourth segment apparently all dark. The merest tip of the small narrow fifth segment shows. *Legs:* indistinct. *Wings:* are considerably longer than abdomen, delicate and practically hyaline, the costa ending practically at tip of the wing and having a double row of sharp-spined tubercles. Both the marginal angles of the first and second posterior cell have long spurs from the fourth and fifth longitudinal vein. The apical cross vein joining the third vein very acutely and not far from the tip of the wing. The third vein barely curves over its whole length outwardly. The vena spuria present, small cross vein quite oblique above the vena spuria, and entering the discal cell just past the first fourth-way point. Stigma very faint. (Redescribed from type).

Locality: Green River, Colorado; Dragon, Utah. Horizon: Eocene.

Holotype: No. 15463a in the University of Colorado Museum, from Green River, Colorado. Also No. 3952 in the Museum of Comparative Zoölogy, from Dragon, Utah, belongs to this species.

This species is unique in having light spots on the second and third segments of the abdomen. The abdomen considered alone is almost identical in its roundness, flatness, type of pile and pattern with that of *Phalacromyia* of the American tropics today. There are no marked species of *Cheilosia* living, with one exception (Europe) and this is of a different sort.

Cheilosia hecate spec. nov.

Plate 3, fig. D; Plate 4, fig. 14

Female: length 8.5 mm. including head; abdomen and scutellum 4.4 mm.; width of abdomen 2.7 mm.; length of wing 6.5 mm.; width of thorax 2.8 mm. *Head:* very little detail can be made out of the head owing to its position. One antennae with its arista is clearly shown. Color of antennae light reddish brown throughout. The third joint oval, tapering to an obtuse point. The arista situated at extreme base of the joint and consisting of an unusually long bristle, evenly and gradually and conspicuously strengthened on its basal half, and held

at an angle of forty-five degrees from the joint. The third joint is about two times as long as the second and the first appears to be ever so slightly longer than the second. First and second joints minutely setose. There is no trace of particularly long setae upon their distal rims, nor is there trace of pubescence on the arista. *Thorax:* the dorsum is dark in color, and covered with fairly long, soft, bristly hairs but not in any sense spinose. However, there are present the extremely long setigerous bristles on both calli and scutellar margin which are the characteristic of many *Cheilosini, Volucellini,* and of *Ferdinandea.* There appear to be four on each side of the scutellum, the median pair crossed, and some weaker ones at base and to one side of the scutellum. The scutellar marginal bristles are at least as long as the scutellum. There are three equally long bristles on the post calli and shorter ones just before the wing. The humeri appears to be pilose. The scutellum is wide with evenly convex rim. *Abdomen:* five segments are visible. The greater part of the first is covered by the scutellum. The second is two and one-half times as wide as long; the third is equally long and practically as wide, whereas the fourth is again two and one-half times as long as wide but is considerably shortened in length. It is about three-fifths as long as the second. The fifth segment is inconspicuous. The most noticeable feature of the abdomen which is unicolorous and dark, is the middle posterior cone of extremely strong, long setigerous bristles. These overlap the following segment. *Legs:* the hind femora very slightly thickened. The hind tibiae slender, together with the hind femora covered with thick moderately long bristly pile. *Wings:* these are of the typical Cheilosinae type. The costa is microsetose. The third longitudinal vein is then strongly deflected on its extreme distal part without even suggesting a kink or bend. As a matter of fact, the first longitudinal vein approaches the costa so insensibly that it could be said the marginal cell was just closed. It would be better to describe it as just open. The second longitudinal vein joins the costa at an angle of twenty-nine to thirty degrees. The anterior cross vein is situated well before the middle of the discal cell, and the spurious vein is quite distinct to within a short distance of the union of lower marginal cross vein and fourth longitudinal vein. The veins are pale brown, the wings quite hyaline, with stigma. Under the high power the small close set villi of the wing are beautifully apparent. These wings were a fourth longer than the body.

Male. Length of this specimen 9 mm.; of wing 6.7 mm.; of abdomen and scutellum 5.3 mm.

Specimen No. 3953 is a profile of this species. The long bristles of

the fourth segment shows nicely and venation is quite indistinguishable from No. 3939. It shows the same subdistal approximation of both of the veins, second and third longitudinal, to each other one. The details of the facial profile are of greatest interest. The antennae are hanging downward and only its narrowest edge or surface shows. It does not furnish much of interest. Beneath the antennae the face is first gently concave, then slowly and slightly produced into what might be termed a gentle tubercle, since it retreats more suddenly below. There is present what appears to be facial strips. Several things are very clearly and indisputably shown: the nature of the profile, the quite convex front, and the degree of production and development of the face and cheeks below the eyes. On the margin of the eyes above the front is a trace of what may have been pile. The specimen is obviously a male. One hind tarsus shows apicotarsal joint, three long bristles, bicolored claw and one pulvillus. The hind femora had long, though delicate, bristles beneath. The pile of the thorax was erect, fairly stiff, short, and abundant.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3929. M.C.Z. Paratype: No. 3953. M.C.Z. (Scudder collection).

Cheilosia pratjei spec. nov.

Plate 11, fig. 93, 94; Plate 12, fig. 104; Plate 13, fig. 111

Male: Length 10 mm.; length of wing 9 mm. *Head:* very large, slightly wider than thorax. Eyes enormous and conspicuous, broadly touching in the male. Upper facets enlarged vertical triangle very small, not quite restricted to the ocelli. Front not large, convex, with a median crease on the upper half. Front thickly long pilose, margin before the antennae lunulate. Antennae located above the middle of the head in profile. Third joint large and flat, scarcely longer than wide, broadly rounded apically. Arista very long, strongly but not sharply thickened basally; about three times as long as the antennae. Face below the antennae with a broad obtuse tubercle apparently near the middle. Due to the angle of the specimen it is impossible to determine whether or not the face is distorted. Face with a single very large obtuse tubercle below the antennae. Face not greatly produced downward. Cheeks easily visible below the eyes, but not prominent, some strong stiff bristly hairs on the lower part of face and cheeks. Upper part of face and region of tubercle appears to have been pubescent only. *Thorax:* very broad; as wide as long, somewhat convex, thickly

and densely pilose. Pile rather long everywhere, pale whitish in color, the pale white pile on the sides before the wing longer and somewhat bristly. Scutellum very large, barely twice as wide as long; the disc and the rim convex, the former covered with thick upright pile, becoming long near the rim and on the margin and rim with forty or fifty long stiff bristly hairs about half of which are set within tubercles, all of these are pale in color. Dorsum of thorax dark, scutellum dark but subtranslucent. *Abdomen:* but little longer than wide, broad and robust, about as wide as thorax, somewhat convex, the apex very broad, the color dark, especially on the posterior halves of the segments. Each segment light brownish or yellowish brown basally. Surface of abdomen thickly long bristly pilose. Hypopygium large and thick, but quite concealed. *Legs:* hind femora elongate, stout but not thickened, with exceedingly numerous, rather long bristly spines which are not sharp pointed but not thick along the ventral surface. Legs dark in color, the bases of the tibiae and the tarsi somewhat brownish yellow. *Wings:* much longer than abdomen quite pointed apically, broadest apically, uniformly dark brownish. Stigma a little darker. Vena spuria very heavy and chitinized. Small cross vein enters the very long discal cell about three-eighths of the way from the base. Marginal cross vein extremely long, practically straight, close to wing margin and parallelling it. The apical cross vein about five-eighths as long as discal cell. The first posterior cell apically drawn out into a very sharp acute point owing to the fact that the apical cross vein joins the third vein practically at the tip of wing. Third vein and costa end at tip of wing.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum of Konigsberg. The specimen bears no label, but the slide is labeled K; I affix the No. H 103.

I take pleasure in naming this species for Dr. Pratje, who gave much courteous and helpful assistance in my study of amber Syrphids.

Cheilosia oligocenica Théobald

Les Insectes fossiles des Terraines oligocenes de France, p. 353, pl. 3, fig. 1.

Length 8.75 mm. *Head:* transverse, almost as large as the thorax; the two large eyes are placed upon either side; the front is slightly prominent. The vertex is elevated and at the front there is a fragment of the basal part of the antennae with the arista lacking. *Thorax:* oval, the scutellum easily distinguished. *Abdomen:* ovoid, with five segments visible. *Legs:* not mentioned. *Wings:* these are well pre-

served and it can be clearly seen that it belongs to the Syrphidae; the longitudinal veins are a little undulated. The general color of the fly is black.

Apparently the preservation of this fly is sufficient to provide good specific characters. A more critical analysis of the wing should throw more light upon the generic and subgeneric relationships of this fly.

Locality: Aix en Provence. Horizon: Oligocene.

Holotype: Am 24, Mus. Nat. Hist. Natur., Paris.

Cheilosia germanica spec. nov.

Plate 11, fig. 83, 95; Plate 12, fig. 99; Plate 13, fig. 112

Male. Length 8 mm.; length of wings 7.5 mm. *Head:* large, definitely wider than thorax. Eyes apparently bare, touching in the male for some distance. Vertical triangle not very small, rather long and acute, due to the fact that the eyes are not as widely touching as in some species, with but nine or ten long curved bristles at the top. Front steep; short; I cannot discern whether it was pubescent but it appears to have been bare. Antennae situated a little above the middle of the head in profile. Third joint large, rather deeper than long, broadly rounded, all the joints and the arista black, the latter a little over twice as long as the antennae, strongly thickened basally with two basal joints discernible. Face and cheeks black, the former with a conspicuous tubercle in the middle. Face beneath the antennae conspicuous. The cheeks very little developed and the face at the angle between cheeks and face produced not more than length of antennae. Occiput very narrowly visible in profile, with a fringe of short bristly hairs. *Thorax:* convex; its pile bristly, moderately long and thick, a few short macrochaetae on the posterior calli and side of the thorax above the wing. Scutellum large, convex on disc and rim, about twice as wide as long, with three or four pairs of long slender bristles on the rim and a few shorter ones on the sides above. *Abdomen:* nearly twice as long as wide, barely wider than the thorax, dark reddish brown in color, widest in the middle of the second segment, gradually tapering past that to the broad and rounded apex of the abdomen. *Legs:* hind femora very stout but little thickened, with only stiff bristles ventrally. Hind tibiae practically as long as femora, rather thickened on the outer two-thirds, the hind basi tarsi as long as the remaining joints and considerably thickened, very dark, femora and most of the tibiae blackish; tarsi apparently very dark brown. *Wings:* uniformly dark brown, obscured by being closely folded and overlapping the abdomen.

Stigma very dark brown. Vena spuria distinct but weak. The small cross vein enters the discal cell a little less than one-third of the way from base. Lower marginal cross vein very obliquely directed away from wing margin. Apical cross vein at first obliquely directed away for a short distance then bent outwards, joining the third vein not far from tip of wing. Third vein and costa end at tip of wing. Wing pointed, apex broad basally, upper squamae with six or seven very stiff bristles, acute apically, the basal marginal angles of the first and second posterior cells spurred.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: at the University Museum at Konigsberg. It bears the number B 16560.

Cheilosia nigrachaeta spec. nov.

Plate 11, fig. 80; Plate 12, fig. 102, 107

Male. Length about 6 mm.; length of wing 5.5 mm. *Head:* large, much broader than thorax. Eyes large and conspicuous, broadly touching in the male, the front not large, steep, very little produced. Impossible to determine whether pilose, pubescent or bare. The antennae above the middle of the head in profile short, third joint large, not as long as wide, broadly rounded apically, the arista half again as long as antennae, strongly thickened on the basal two-thirds. The first and second antennal joints dark brown, third joint lighter in color, especially basally, rather thick on the bottom. Face concave below the antennae, with a very distinct tubercle. Owing to poor preservation, it is difficult to determine the nature of the covering. It appears to have been densely pubescent. Face not produced away from eyes for more than the length of the antennae. Crease of the side margins deep. Occiput scarcely visible in profile. From above, the posterior profile is considerably concave about the vertex and behind the ocelli. *Thorax:* quite convex, the dorsum and scutellum very large, a little over twice as wide as long, the apex a little flattened. The margin with a few long slender bristles; the calli and sides of the thorax with strong short macrochaetae. *Abdomen:* a little longer than broad, quite robust, barely wider than thorax, much of it obscured by the wings and preservation. *Legs:* more slender, barely thickened a little in the middle with stiff bristles only ventrally. Legs dark brown, tarsi somewhat yellowish brown. *Wings:* uniformly pale brown, marginal angles of the first and second posterior cells with spurs. Lower marginal cross vein short, more or less straight, strongly directed away

from wing margin, the last section of the fourth vein before the origin of the apical cross vein rather long and two-fifths as long as apical cross vein. Apical cross vein sinuous at origin, joining third vein near the tip of the wing. Third vein and costa end at tip of wing. Stigma not darker than remainder of wing. Vena spuria faint. Anterior cross vein oblique, joining the discal cell a little less than a third of the way from base.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen bears the number B 14281.

Cheilosia bruesi spec. nov.

Plate 11, fig. 90; Plate 12, fig. 98; Plate 13, fig. 118

Male. Length 7.5 mm.; length of the wings 6.5 mm. *Head:* large, wider than thorax, the eyes apparently bare, anterior facets enlarged, touching in the male but not for a great distance. Vertical triangle large, not restricted to the ocelli, the front small, protuberant at the level of the antennae, subconvex, somewhat steep, apparently without pile. The presence of pubescence cannot be ascertained. Antennae situated about the middle of the head in profile, but a little below the middle of the eyes. Antennae short, third joint very large, suborbicular, scarcely longer than wide, all of the joints and the arista dark reddish brown, the latter but little longer than the antennae, strongly thickened on the basal half. Micropubescent. Face beneath the antennae quite concave, rising to the low, obtuse, but otherwise well formed tubercle, which is situated a little above the level of the bottom of the eyes, then descending gently below the tubercle to the margin of the epistoma, a distance half as long as the tubercle itself. Face somewhat produced at the angle between the cheeks and face at least as long as the antennae. Facial strips wide and conspicuous. Occiput visible only on the lower third behind, with some strong bristles above and at the vertex and some long fine hairs at the bottom near the cheeks. *Thorax:* dark in color, very convex, the pile sparse, short. Scutellum quite large, semicircular, convex on disc and rim. Marginal bristles short, the apical two bristles the longest, not very heavy and scarcely half as long as the length of the scutellum. *Abdomen:* twice as long as wide, wider than thorax and widest at end of second segment from which it tapers gradually to the broad obtuse apex of the hypopygium. Four segments, a small portion of another on the left hand posterior corner and the exceedingly large globose hypopygium are visible. The

first two segments occupy scarcely more than a third of the length of abdomen. Abdomen sparse, short bristly, with a little longer bristly pile at the sides of the second segment at the base. *Legs:* hind femora short, somewhat thickened, the thickening spread over the whole length, the ventral surface of the femora for the greater part of the length, especially outwardly, with short spinous bristles. Hind tibiae seven-eighths as long as femora, considerably thickened on the apical half, blackish in the middle and very dark brown basally and apically. Femora very dark brown. *Wings:* considerably longer than the abdomen, the third longitudinal vein scarcely bent downward, ending with costa practically at tip of wing. Vena spuria faint, the last section of the fourth vein about two-fifths as long as the apical cross vein, barely sinuous. Basal marginal angle of first and second posterior cells short spurred, the apical cross vein very long, barely sinuous, joining the third vein rather close to apex.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The amber block was marked "Family Leptidae" by someone. I affix the number 5 B 348 on the block.

Cheilosia sepultula Cockerell

Proc. U. S. Nat. Mus. 51: 96 (1917)

This species was described in a comparative way by Cockerell with reference to *C. miocenica* Cockerell. This method is not entirely satisfactory in such a large and difficult genus and an examination of a type will be necessary to determine its specific nature. I quote below the measurements taken by the author of the species.

Length about 8.5 mm.; width of thorax about 3.5 mm.; length of wings 8 mm. The head and thorax are dark. The abdomen is pale, thinly pilose with black or very dark, narrow, sutural bands but no longitudinal vittae. The costa is thick with two rows of minute bristles as in *C. miocenica.* The apical angle of the first posterior cell is more acute than in *miocenica.* In the following measurements those for *miocenica* are given in parenthesis.

Width (depth of marginal cell) .3 mm. from end.... .35 (.27) mm.

Length of first posterior cell from lower basal corner to upper apical corner..... 4 (4) mm.

Submarginal cell on first basal (not allowing for curve)..... 1.2 (1.28) mm.

First basal on second posterior..... .83 (1.09) mm.
Second basal on second posterior..... .27 (.32) mm.
Second basal on third posterior..... .3 (.25) mm.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: no. 61994 U. S. N. M. I was not able to locate the type.

"The smaller specimen, assigned to *C. miocenica*[1] and collected by Mr. Rohwer, belongs to this species."

This species is unrecognizable on the basis of its present description. There are so many species of *Cheilosia* differing in minute ways that a comparison from a photograph is needed.

Genus Cheilosialepta genus nov.

Head: very large, widely holoptic in the male. Eyes bare, anterior facets enlarged, vertical triangle small with protuberant ocelligerous tubercle and with a few long curved bristles. Front not large, steep, flat, densely pubescent only, nowhere markedly swollen or convex. Antennae short, third joint very large, little longer than broad, thin above, rather thick below. Arista elongate, strongly thickened basally and pubescent. Face quite narrow, almost carinate, due to the pinched and thinned central ridge, which is broadly rounded. There is only the faint indication of a tubercle in the male, and the female with similar narrow and protuberant face is without tubercle, and very narrowly concave. *Thorax:* convex, the margin of the mesonotum, posterior calli, upper part of mesopleurae and the rim of the scutellum as well as posterior margin of the mesonotum before the scutellum everywhere equipped with enormous heavy machrochaetae suggesting *Ferdinandea* (Recent genus), but of course the face is very different from *Ferdinandea.* Scutellum very large, perfectly semicircular, with convex rim and disc. *Abdomen:* large and elongate. Hind femora slender without spines below. The hind tibiae with strong bristles laterally near the middle. *Wings:* very much like those of *Myiolepta.*

Genotype: *Cheilosialepta baltica* spec. nov.

This genus is distinguished from *Myiolepta* by the narrow, almost carinate face, the more broadly holoptic eyes of the male, the heavy macrochaetae of thorax and scutellum and the semicircular shape of scutellum and the absence of spines on the hind femora and the presence of spinous macrochaetae in the middle of the hind tibiae. It

[1] Bull. Amer. Mus. Nat. Hist. **26**:72. (1909).

differs from *Cheilosia* by the non-tuberculate face of either sex and the *Myiolepta*-like venation.

Cheilosialepta baltica spec. nov.

Plate 8, fig. 54; Plate 9, fig. 67, 68, 69; Plate 10, fig. 79

Male. Length 7.5 mm.; length of wing 6 mm. *Head:* very large, distinctly wider than thorax. Eyes enormous; anterior facets but little enlarged; eyes touching broadly in the male. Vertical triangle small, restricted to the ocelli. Bristles erect, long, and stiff; they consist of a cluster of fourteen, two of which are placed at the extreme posterior end of the triangle. Front not large, bare, densely pubescent, with a lunulate margin above the antennae. Antennae short; the third joint quite large, half again as long as wide. Arista long, strongly thickened basally, about twice as long as antennae; all of the joints reddish brown, not very dark. Arista blackish. Face reddish brown, quite concave, below the antennae rising to a large conspicuous tubercle and then abruptly descending the short distance to the epistoma. Face not deeply produced, cheeks very short in profile. Occiput scarcely visible at any point due to the prominence and curvature of the eyes and with a fringe of delicate hairs. *Thorax:* convex, barely longer than wide; the dorsum with thick, short bristles. Humeri pilose; mesopleura with one excessively long heavy bristle. Side of thorax behind the humeri with three long bristles. Margin of the dorsum just above the base of the wing with three heavy bristles and the posterior calli with three heavy still longer bristles. The dorsum of the thorax just before the scutellum with four heavy long bristles and the margin of the scutellum with four pairs of very long, very heavy bristles longer than the length of the scutellum. Disc of scutellum somewhat flattened, thick, short, bristly, in shape twice as wide as long, extreme apical margin a little subtruncate, the rim broadly rounded. *Abdomen:* a little more than half again as long as wide, tapering considerably from the end of the second segment; the last two segments scarcely longer than the first two; only four segments visible. Sides of the abdomen slightly curled over, quite thin. Abdomen quite convex, the posterior segment sub-cylindrical. Hypopygium large and rounded, quite concealed. Abdomen short, appressed bristly, some very long stiff bristles at the base and sides of the second segment, and a strong radially directed tuft of shorter bristles at the junction of the first and second segment on sides. *Legs:* hind femora a little thickened on the basal two-thirds. Ventrally equipped only with stiff relatively short bristles. These

bristles might be described as subspinous but they are not true spines. *Wings:* considerably longer than abdomen, the very long, almost strong apical cross vein joins the third vein almost at the tip of wing. Third vein a little drawn down on the outer third, ending with the costa, but not prominently. The marginal cross veins practically parallel the wing margin and both of the basal marginal angles of the first and second posterior cells are spurred. Vena spuria distinctly and heavily chitinized. *Wings:* pale yellowish. Stigma deep brownish-yellow.

Female. This female is more poorly preserved in many respects than one that I describe as the male. The hind tibiae bear in the middle on the outside a row of six or seven long stout bristles, the coxae bear a fan-like row on the outside of four stiff bristles and others at the point where they touch; the metasternum bears a very few long hairs but is mostly bare. The color of the legs is dark brown; bases of the tibiae and anterior tarsi somewhat lighter. The apex of the middle femora on the outer lateral side bears a little cluster of three stiff long bristles.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. This specimen bears the number 11B665 on the block itself; the slide on which it is mounted bears the number 2665 and also bears the following designation: VII. 2. 288 (Museum Stantien and Becker).

Paratype: in the University Museum at Konigsberg. The specimen bears the label B 16787, the slide the number 16787.

Genus Arctolepta gen. nov.

Head: large, much broader than thorax, in profile from above very concave. Front quite flat, somewhat prominent. Antennae barely above the middle of the head in profile, short, third joint large, not longer than broad, very orbicular. Arista elongate, face deeply concave. Epistoma thrust forward. Occiput visible in profile throughout. *Thorax:* very little longer than broad, quite convex; scutellum large, convex on disc and rim with many long bristles on the margin of the scutellum but none on the mesonotum before it. Mesonotum on sides and posterior calli with some long bristles. *Abdomen:* elongate, over twice as long as wide, rather flattened basally, somewhat convex on the terminal segment. Pile short, appressed, bristly. *Legs:* hind femora stout, but not greatly thickened, slightly arcuate with many stiff bristly spines below and apically. Hind tibiae practically as long as femora. *Wings:* elongate, not as long as abdomen. Apical cross vein joining third vein some distance before the tip of wing. Vena spuria

present and weak. Apical cross vein slightly sinuous; last section of the fourth vein relatively short.

Genotype: *Arctolepta calamitans* spec. nov.

This fly cannot go in *Cheilosia* for lack of tuberculate face or *Myiolepta* since the scutellum is chaetate and the apical cross vein is confluent remote from tip of wing. It differs from *Sericolepta* in the spiny scutellum, orbicular antennae, and the simple femora and long tibiae, small size, much shorter apical cross vein, and the wings not being as long as the abdomen. In *Sericolepta* in spite of the large abdomen, the wings are much longer. From *Cheilosialepta* it is at once very distinct in the remote point of confluence of the apical cross vein.

Arctolepta calamitans spec. nov.

Plate 6, fig. 36; Plate 10, fig. 74–76

Female. Length 10 mm.; length of wing 6.4 mm. *Head:* very large Eyes bare, front and vertex and cheeks black in color, the front with some scattered light erect pile. Face pubescent only. Antennae light brownish orange, the basal bristles black. Arista black. Occipital bristles above stiff and black, the pile in the middle and below is pale. *Thorax:* dorsum of thorax and scutellum black in color, aeneus. The pile on the sides pale and erect. The many short bristles that broadly cover the mesonotum, together with the macrochaetae on the sides and scutellum, are black. *Abdomen:* black throughout, the short stiff spinous bristles appressed and black and very sharp and very little longer even at the extreme tip of the abdomen. Bristles of genitalia pale. *Legs:* throughout black in color except that the anterior tarsi are brownish red. Hind basi tarsi as long as the remaining segments, somewhat thickened, the bristles below brush-like and thick. The pile at the base and along the dorsal length of the hind femora, the bristles and spines below and on the tibiae and the strong spines and the apex of the hind tibiae as well as the middle tibiae black. *Wings:* uniformly brownish. Last section of fourth vein about half the length of the marginal cross vein, the small cross vein is extremely oblique above the vena spuria and enters the discal cell almost at the midway point but is basal. Both the marginal angles of the marginal cells with very short spurs.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg, from Baltic amber, number X444.

Genus PROTORHINGIA genus nov.

Head: large, the eyes particularly conspicuous and bare. Upper facets somewhat enlarged, broadly touching in the male, the vertical triangle in the male quite small, restricted to the ocelli which are strongly raised above the surface. Front small, rather steep, scarcely protruding. The antennae located distinctly below the middle of the head in profile. Antennae short, but the third joint quite enlarged and about twice as long as wide and suborbicular. Arista very long and slender, not noticeably thickened at base, bare. Face below the antennae gently concave and retreating, the epistoma barely produced forward. Face without tubercle. Face below the eyes but little produced and in length about equal to length of the antennae. Occiput narrowly visible on the lower part of the head, not in the slightest discernible on the upper two-thirds of head. *Thorax:* broad, about as wide as head across the wings, dorsum quite convex. Scutellum very large, hemispherical, convex on the disc and rim. Thorax and abdomen short pilose, the former with a few macrochaete. Scutellum with many long stiff bristles about apex. *Abdomen:* quite short, broad, compact, the terminal segments narrow, curling down and thin at the sides. *Legs:* hind femora short, very little thickened with only a few stiff bristles disto-ventrally. *Wings:* elongate, much longer than abdomen, with typical *Syrphus* venation, except that the costa and with it the third vein are grossly and conspicuously pulled down beyond and below the tip of the wing for some distance and are as conspicuously bent downward as most *Volucellas* are bent upward. This leaves the sub-marginal cell grossly widened and flared at apex. The marginal cross veins are long, due to the length of the wing, close to wing border, almost parallel to it, and the basal posterior angles of both their respective cells are spurred. Wings villose throughout.

Genotype: *Protorhingia carpenteri* spec. nov.

The genus *Protorhingia,* it seems to me, is a well founded one, for the wing in its way is extremely unique. A very few of the two hundred or more living species of *Cheilosia* show a somewhat similar wing in regard to the great extension of the costa around the end of the wing. Since this is a characteristic of *Rhingia,* which is, of course, abundantly distinct on the basis of its conoidal snout, it seems at once apparent that the form that I now describe is a true connecting link between *Rhingia* and *Cheilosia* and it is possible that these few living members of *Cheilosia* should be put in *Protorhingia.* There is this difference, however, between *Protorhingia:* modern *Cheilosia* must have the face

tuberculate in the male. In fact, a large number of *Cheilosia*-like forms from the amber, species which in every way suggest our *Cheilosia* probably cannot be placed in the genus *Cheilosia* in the modern sense purely because one of their sexes is non-tuberculate. It will be remembered among the living genera of the subfamily Cheilosinae that there are a considerable group of genera sharply separated from *Cheilosia* and its congeners on this very character of only males tuberculate. It seems evident with so many concaved-faced species and genera from the amber that we are witnessing, when combined with living forms, the three types of facial combination:

a. Faces of both sexes distinctly non-tuberculate.
b. Faces of one sex tuberculate (always male?).
c. Faces of both sexes distinctly tuberculate.

PROTORHINGIA CARPENTERI spec. nov.

Plate 10, fig. 77

Female. Length 10 mm.; length of wing 9 mm. *Head:* front and vertex not very widely separated, perhaps separated by three-tenths of a millimeter. Antennae with the third joint apparently quite large and but little longer than broad, its shape is somewhat obscured owing to whitish excretion. Face not greatly produced but the cheeks are certainly deeper than in *Protorhingia magnipennis;* at the lower part of the face there is a certain amount of vesicular swelling that incloses a few bubbles. *Thorax:* dorsum of thorax with one bristle behind the humerus and two quite long ones on the posterior calli. The pile of the dorsum of the thorax is quite short with an occasional longer bristle. Scutellar disc also very short, bristly pilose with only a few long bristles on the margin. One or two of these are broken off but there appears to have not been more than six or eight bristles two-thirds of the length of the scutellum. Scutellum convex with convex rim. Color of thorax dark, shining brown with three vittae black in color fused on the anterior two-thirds and V-shaped posteriorly. It is possible that in life these were not discernible or at least obscure. *Abdomen:* a little over half again as long as wide, tapering gradually from the end of the second segment. Base a little bit wider than the thorax and narrowly luteous or subtranslucent in color. The remainder of the abdomen, including the last half of the second segment, quite dark. Abdominal pile short, thick, and bristly. *Legs:* hind femora short, very little thickened, with only a few stiff bristles disto-ventrally. *Wings:* hyaline in color, the basal and anterior marginal area, including the stigma, ob-

secured by bad preservation. The last section of the third vein past the confluence of the apical cross vein is very short and is about one-fourth the length of the subapical cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: no. 3969, Mus. Comp. Zoölogy; consists of a crude specimen preserved in an uncut piece of Baltic amber, purchased by the author from the Bernstein company in Konigsberg.

Protorhingia magnipennis spec. nov.

Plate 10, fig. 78

Male. Length about 12 mm., the length of the wing 12 mm. *Head:* quite large, the posterior occipital fringe very short and consisting of but a few rows of hairs except in the region of the very short slightly convex cheeks where it is a little longer. Facial strips narrower than *carpenteri*, the antennae dark reddish, lighter above and near the base; the apex and lower portion blackish. The arista dark in color, pile of vertex longer than elsewhere on the head, erect and somewhat stiff. Front very slightly convex, with scarcely any trace of median impression and densely pubescent; apparently pale in color. The cheeks, narrow sides of face and apparently the greater part of the face except for a somewhat triangular area on the sides pale pubescent or pollinose. *Thorax:* densely erect, bristly hairy. The pile becoming somewhat appressed on the posterior part of the dorsum. Surface pile of scutellum dense, longer than that of dorsum of thorax, the marginal bristles quite stiff, nearly two-thirds as long as scutellum and composed of about fifteen or more on the semi-circle. The color of the thorax and scutellum appears to have been brilliant coppery or violet. Humeri pilose, two small bristles directly in front of the wing, three others on a level with or behind the humeri, three on the posterior calli. Apex of the dorsum before the scutellum without marked bristles. Abdomen subshining metallic. Pile erect, thick, and bristly and not very long, appressed only at the extreme margins of the terminal segment. *Legs:* hind femora obscured by poor preservation, the anterior femora small, slightly arcuate, considerably thickened, and with a row of long stout bristles on the posterior side. *Wings:* more or less hyaline, especially apically, the basal point a little yellowish or brownish, the stigmal cell deep yellowish brown. Vena spuria weak and faint but with a conspicuous node just past the origin of the second and third longitudinal veins. Alulae quite large and appear to be rather dark; their fringe is long. The veins of wings are strong and the section of third vein from the

confluence of the apical cross vein to the tip is not quite one-third of the length of the apical cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg, No. K7559 (collection Klebs).

Rhingia species Hope

Trans. Ent. Soc. London, 4: 252 (1845–47)

Sex indeterminate. Length 11 mm. This specimen is very unsatisfactory in many ways. While it appears to be a *Rhingia,* the venation cannot be worked out with sufficient certainty to determine its nature. I therefore refrain from assigning a specific name.

Locality: Aix in Provence, France. Horizon: Oligocene.

Holotype: Hope Museum, Oxford, England. The type was studied.

Rhingia zephyrea spec. nov.

Male (apparently). Length 7.8 mm.; of abdomen and scutellum 4.6 mm.; of wing 6.6 mm. *Head:* preserved from dorsal view. The epistoma projects conoidally in front of the face. The antennae are scarcely discernible. No details can be seen. Face dark in color. *Thorax:* dark in color. Pile not discernible. Scutellum evenly convex on margin; about one and three-fourths wider than long, its margin with one or two long bristles and numerous short, fine hairs. *Abdomen:* oblong, apparently more so than in present day species, which have the abdomen almost round. Only four segments including the first show with any degree of distinctness. There are faint indications of the outline of the fifth. The abdomen was uniformly dark in color with the possible exception of the basal half of the second segment. Much of the pigment is gone, but almost exactly the right posterior quarter of that of the second segment remains, and from the even gradation of this pigment-area's anterior margin it seems likely that the base of the segment was pellucid. *Legs:* wanting. *Wings:* well preserved in places. The anterior cross vein is quite before the middle of the discal cell. The costa ends quite beyond the tip of the wing as it should in the modern concept of this genus; the second and third longitudinal veins are, therefore, decidedly arched and convexed distally. The subapical cross vein is more or less evenly convex on its outer edge.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3946, in the Museum of Comparative Zoölogy. This is the specimen referred to by Williston (1886).

Pipiza melanderi spec. nov.

Plate 2, fig. C

Female. Length 13 mm.; length of abdomen 7.5 mm.; of wing 7 mm. *Head:* quite globular, smaller than the thorax. The antennae set apparently a little below the middle of the head in profile, short, the third joint of moderate size, scarcely longer than wide. Arista not showing. *Thorax:* small, short, and broad and dark in color. The pile delicate and apparently erect and not very long. The outline of the scutellum, since the fly is a little bit twisted to one side, appears to have been less than twice as wide as long with an evenly circular margin. *Abdomen:* slender and preserved in such a way that there is a slight appearance of narrowness at the base. This is probably due to the partial sidewise position of the fly. Abdomen two and one-half times as long as wide, dark in color with a pair of basal pale-colored spots on both the second and third segments. These spots are odd in shape and rather widely separated. There is a trace of such spots on the fourth segment. Pile of abdomen fairly long and delicate. *Legs:* the hind femora are visible. They are slightly thickened and their pile, at least on the ventral part, is short but stiff. The tibiae practically as long as the femora but slightly arcuate. *Wings:* well preserved and with typical *Pipiza*-like venation. The marginal cross veins are slightly bowed inward near the middle and there is a suggestion of an inwardly directed spur. There is a short spur directed upwards towards the end of the vena spuria from the fourth longitudinal vein just before that vein joins the lower marginal cross vein. Small cross vein enters the discal cell barely more than a fourth the distance from the base.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: no. 154, coll. American Museum of Natural History.

Pipiza venilia Heyden

Palaeontographica, **17**: 260. Pl. 45, fig. 28. (1870)

The description and illustration given by the author present the following points of interest and value.

Length 7 mm. The specimen lies upon its side so that the wing is partly obscured by the abdomen. The head is fairly large; the eyes are large and holoptic; the front is projecting and rounded. The antennae are wanting. *Thorax:* is longer than broad. The scutellum was about half as long as the dorsum of the thorax with entire unspined margin.

Abdomen: was elongate, twice as long as broad, and a little broader in the middle. Five segments are visible, the first four of almost equal length. There is some black pile posteriorly upon the segments. *Legs:* are almost wholly wanting; only traces of the femora are visible. *Wings:* the middle of the wing is clearly shown and the vena spuria is visible and determines definitely its place within the Syrphidae. Heyden states that the first posterior submarginal cell is prominent over the discoidal cell and the upper anterior angles of the first posterior cell is pointed; the small cross vein lies upon the basal side of the discal cell; the tip of the wing is not clear so that it cannot be seen if the submarginal cell is open or closed.

Locality: Rott, Germany. Horizon: Oligocene.

Type: One specimen in the Krantz collection. I was not able to locate the type.

This species is based upon a well preserved specimen, but since the living flies in the group Pipizini are especially difficult to classify and recognize, it is obvious that the type should be re-studied.

Genus Pseudopipiza subgenus nov.

Since the species *antiqua* is not strictly congeneric with modern *Pipizas* it seems to me sensible to place it in a separate genus. It cannot be determined definitely that the eyes are pilose though apparently they are. If so, this would be like modern *Pipiza* to this extent. The face is bulging out definitely about the region of the epistoma. The eyes prominent and face and head thickly hairy as in *Pipiza*. *Thorax:* convex, thickly, delicately pilose without macrochaetae. The scutellum large, semicircular but with the rim thin and much flattened in contrast to *Palaeopipiza*. The abdomen drooping as in *Pipiza* or *Palaeopipiza*, much convex but rather more densely pilose. The hind femora are a little more thickened and spinose perhaps, the apical cross vein is quite long and joins the third vein practically at tip of wing, more closely than in the living species.

Genotype: *Pseudopipiza antiqua* spec. nov.

Pseudopipiza differs from the present-day *Pipiza* in the face and in the confluence point of the apical cross vein being practically at wing tip. It differs from *Palaeopipiza* in the different face, very pilose head and thorax and the much thinned scutellar rim. In the latter genus the margin of the scutellum is thick and convex.

PSEUDOPIPIZA ANTIQUA spec. nov.

Plate 11, fig. 86; plate 13, fig. 113

Male. Length 4.5 mm.; length of wing 3.3 mm. *Head:* eyes touching broadly, apparently pilose. Antennae situated two-fifths of the distance from the top of the head. First two joints very short; third large, slightly subquadrate, barely longer below than wide. Arista basally thickened, slender on the apical half. Face below antennae very slightly concave for some distance, bulging out a little near the epistoma; not tubercular. Face, front, cheeks and occiput dark. Antennae brown, arista pale. Pile of entire head pale silvery, very thick on the face and cheeks, present on front. *Thorax:* and scutellum, dark in color, the margin of the scutellum very thin and impressed and the pile of scutellum and thorax everywhere quite long and delicate and very dense. *Abdomen:* drooping from the base, very convex and subcylindrical past the second segment; its pile thick delicate, subappressed, everywhere pale. Hypopygium large, rounded, prominent, together with the whole abdomen dark in color. Abdomen and thorax obviously shining or aeneous. *Legs:* hind femora somewhat thickened, with thick bushy pile above; a few bristly delicate spines, perhaps only bristles apically. *Wings:* with venation like *Pipiza*. Marginal angles of first and second posterior cells spurred, lower cross vein straight, apical one long, curved inward on the first half but is actually almost imperceptibly curved over its whole length, the curve upward, the last section of the fourth vein before the origin of the apical cross vein straight and a little longer even than the lower marginal cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the Geologisch-Palaontologisches Institut and Museum der Universität Berlin. I affix the number H 220 to the specimen. Allotype: H 221, female; same museum.

PSEUDOPIPIZA EUROPA spec. nov.

Plate 11, fig. 96; plate 13, fig. 121

Female. Length 5 mm.; length of wing 4 mm. *Head:* barely wider than thorax, hemispherical. The front wide and the eyes broadly separated even at the vertex. Antennae set below the middle of the head in profile; short; third joint moderately large, as long as wide and broadly rounded. The arista is a little longer than the antennae and is strongly thickened on the basal two-fifths. The face below the antennae is gently concave and has only a slight suggested protuberance about the oral margin. The face is short and not at all produced. The

cheeks, while not conspicuous are well developed. The occiput is very narrowly visible above and below. The posterior occipital margin viewed from above is shallowly concave. There is some short, sparse pile on the front and some longer, forward-directed, bristly hairs at the top of the vertex. The cheeks are short pilose. There seems to be a few erect hairs on the face, which are very sparse. *Thorax:* convex, short, erect pilose. The scutellum is short and small, its margin semicircular with some delicate, upturned-bristles on the margin. There are a few long, slender bristles on the calli and before the wing. *Abdomen:* nearly twice as long as wide and short pilose; the posterior segments are narrow and quite convex. The abdomen was apparently aeneous in life. *Legs:* hind femora short and quite slender with a barest suggestion of a thickening just past the middle; equipped ventrally and distally with very fine, sharp bristle-like spines. The hind tibiae are slightly arcuate and thickened distally and end transversely.

Holotype: a female in the Geologisch-Palaontologisches Institut und Museum der Universität Berlin No. H 221. Found in Baltic Amber (Lower Oligocene).

Chrysogaster antiquaria spec. nov.

Female. Length 5.0 mm.; of wing 3.8 mm.; of abdomen and scutellum 2.4 mm. *Head:* small dark colored fly, preserved in exact profile. The farthest projection of the face seems to be about one-third the height of the head from below, this seems to be sharply but obtusely angulate rather than tuberculate and below this point the face recedes away. Above this point the face recedes to the point of antennal attachment and above the point of antennal attachment the long front is rather convex but wrinkles cannot be seen. It must be admitted that in this specimen the point of attachment and characteristics of the antennae are open to two interpretations, since below the point of attachment as described, and arising from the angular point of the face, there is a slender attached body which may consist of two or three slender antennal joints. If this is true, the face just above the antennae is concave and the antennae would be situated very low upon the profile. This seems improbable. At the point of the face described as the locus of the antennae, the profile is slightly damaged, but a body does arise there which consists quite probably of the real antennae. Three joints can perhaps be made out. The first two joints are short and the third is oval, about two or two and a half times as long as wide. The fly belongs, therefore, to the subgenus *Orthoneura*. The eye

facets are not visible. *Thorax:* gently convex, a little sloping just in front of the head. Scutellum small and flat. No pile can be discerned on the thorax. *Abdomen:* fat, the tergite and sternite wide apart; obviously the abdomen was tumid with eggs. Six segments can be seen and there are others long drawn out and tapering, as characteristically precede the ovipositor of these flies, but they are obscured by other matter and the exact number is uncertain. No pile is visible. *Legs:* small and doubled up. They were mostly pale in color, the distal halves of the tibiae and the tarsi dark in color, the basal parts of the legs pale. Some fine hair can be discerned upon them. The hind femora is slightly thickened; it is about one and a half times, or less, as thick as its tibiae. *Wings:* hyaline; if infuscation was present it is not evident. The last section of the sub-apical cross vein joins the third vein nearly at right angles. It might be described as slightly recurrent. The venation is difficult to make out, but from one position, with the right slant, the more important details can be very well seen.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 12621, in the Museum of Comparative Zoölogy. This is the specimen mentioned by Williston (1886).

Genus Cacogaster genus nov.

Head: large and broad. Front and face quite wide and rounded in profile from above. Arista elongate and slender. The antennae apparently low upon the profile of the head since no trace of them shows. *Thorax:* broad and robust. *Abdomen:* short and wide, being shorter than in *Syrphus* but not quite as round and flat as in *Rhingia.* The pattern of the abdomen is unique and the many small isolated spots suggest patterns that are often seen in certain gadflies but not in Syrphids. *Wings:* venation *Syrphus*-like. Marginal cell open. Third longitudinal vein straight. Anterior cross vein well before the middle of the discal cell. Spurious vein present and extensive. Costa and third vein end at the tip of the wing.

Genotype: *Cacogaster novamaculata* spec. nov.

The particular characteristics of this form lie in the wide front and face, its convexity, and the short abdomen with its unique type of maculation. Better specimens are needed to place it finally in its phyletic position, but this can be said of many fossils since the key characters to exact position are usually so minute that they are seldom preserved except in amber.

CACOGASTER NOVAMACULATA spec. nov.

Plate 6, fig. 37

Sex indeterminate. Length 8.8 mm.; length of body and scutellum 5.2 mm.; length of wing 6.3 mm.; width of abdomen 3.0 mm. *Head:* very little detail shows. The eyes seem to be separated, antennae are not visible, both aristae appear, and are long and thickened; the antennae themselves were certainly quite short. *Thorax:* short and broad and dark in color. Very short pile present on thorax. Scutellum about one and three-eights times as broad as long. Margins simple, evenly rounded and without pile or bristles. *Abdomen:* with five segments and three others visible terminally. First segment dark, nearly covered by the scutellum. The succeeding three segments marked each with three subtriangular spots on the posterior border, a median one and one on each side, in each postero-lateral corner. The median spot on the second segment is largest and continuous as a band to anterior margin interrupting the segment; the median ones of third and fourth segments failing to reach the anterior margin and progressively smaller. The median spot of third segment almost an equilateral triangle. Second segment a little longer than third; third and fourth equal. Third segment two and three quarters to three times as wide as long. Abdomen covered with short decumbent dark bristly pile, somewhat thicker on the posterior part of fourth segment. *Legs:* hind femora moderately thickened, hind tibiae slightly so. Hind femora appears to be without spines or setae apically. Hind tibiae slightly thickened and covered with thick short ventro-decumbent bristly hair. *Wings:* these are of the Syrphine type. Marginal cell open. Third longitudinal vein straight; anterior cross vein well before the middle of the discal cell. Costa microsetose. Spurious vein evident, reaching almost to fusion of fourth longitudinal vein and postical cross vein. Third longitudinal vein practically straight until close to tip, then with a gentle downward concavity before joining costa at tip of wing, where costa ends. Second longitudinal vein joins costa at an angle of about twenty-five degrees.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: no. 3940 in the Museum of Comparative Zoölogy. (Scudder collection.)

This is a very peculiar form which is so aberrant from any Syrphid type I am acquainted with that I hesitate to place it with *Syrphus*. The body is intermediate in shape between *Syrphus* and *Rhingia*; the maculation reminds one of a large group of *Tabanus* but of no Syrphids I have seen.

Myiolepta valida spec. nov.

Plate 11, fig. 89; Plate 12, fig. 97, 108

Female (apparently). Length 7.5 mm.; length of wing 5.6 mm. *Head:* large, wider than thorax; eyes conspicuous, rather widely separated, nowhere approximated. Antennae located about the middle of the head in profile, due to the position of the specimen the exact position of the antennae cannot be ascertained. Antennae short, third joint large, perfectly rounded, but little thickened, and flat on the sides. Arista three times as long as the third joint, strongly thickened basally and pubescent. Antennae dark reddish brown, face apparently without tubercle but deeply concave below the antennae and the epistoma bluntly protuberant. The antennae reaching almost to the epistoma and certainly reaching below the middle of the face in profile. Head very much obscured by whitish exuvia. *Thorax:* well preserved, thickly, short appressed setate. The sides of the thorax before the wing with four large stiff bristles, one such bristle on the mesopleura and three on the posterior calli; none on the apex of the dorsum before the scutellum but the margin of the scutellum has three pairs of exceptionally stiff heavy long bristles and a few weaker ones basally. Disc of scutellum with many short bristles. Margin of scutellum convex, form semicircular. *Abdomen:* short, broad, and robust, wider than thorax, together with the legs much obscured by white exuvia. *Wings:* nearly hyaline, very pale brownish, thickly long villose, the stigma a little bit darker. Vena spuria quite faint, small cross vein very little oblique above the vena spuria, joining the discal cell exactly one third of the way from base. Posterior basal angle of the lower marginal cell spurred, lower marginal cross vein straight, the posterior marginal angle of the first posterior cell without any spur, the subapical cross vein gently sinuous at first and then proceeding straight and acutely to join third vein practically at tip of wing.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is not marked; the slide is marked S. I affix the Number H 104 to the slide. Paratype: no. 22195 in the British Museum of Natural History.

Myiolepta andreei spec. nov.

Plate 11, fig. 88; Plate 12, fig. 103, 105; Plate 13, fig. 114

Female: Length 6.5 mm.; length of wing 4.3 mm. *Head:* large, wider than thorax viewed from above. The head is rather thick, eyes

rather broadly separated, nowhere angularly approximated. Front a little produced but not conspicuous. Antennae situated in middle of head in profile, short, third joint large, broader than long, rounded apically; the arista but little longer than the antennae, strongly thickened on the basal half, pubescent; the entire antennae almost black. Face below the antennae distinctly concave. Epistoma not greatly produced. The face at this point being barely as long as third antennal joint, cheeks in profile narrow. Occiput strongly visible and conspicuous on the lower three-fourths of the eye margin but quite invisible above this point, its upper margin is set with stout spines, the lower part short pilose. *Thorax:* scarcely longer than wide, the posterior part of the thorax past the wings much narrower. Scutellum of moderate size, a little more than one and one-half times as wide as long, a little bit flattened, the apex subtruncate, the margin with a few short stiff bristles. Thorax without the second segment tapering gradually to the broadly rounded tip. Surface of abdomen short setaceous, with some longer pile at the sides and base of the second segment. Terminal segments very convex, color of abdomen light brown; subtranslucent, but this is probably due to the preservation. *Wings:* nearly hyaline. Stigma barely darker. Vena spuria very faint. The last section of the fourth vein before the origin of the apical cross vein is long but not quite as long as lower marginal cross vein, the latter slightly bent inward and its origin spurred from the fifth vein. Apical cross vein barely bent inward shortly after its origin, the remainder straight, joining third vein a short distance from tip of wing, but not as close to it as is usual in *Myioleptas.*

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is B 14586 and the slide is 14586. This species is named for the Director of the Konigsberg Museum.

Myiolepta germanica spec. nov.

Plate 11, fig. 91, 92; Plate 12, fig. 101, 106; Plate 13, fig. 120

Female. Length 8 mm.; length of wings 6.3 mm. *Head:* much broader than thorax, very large. Eyes conspicuous, bare, broadly separated, nowhere approximated. Front short pilose, pubescent only on the lower part. Antennae set at about the middle of the head in profile, short. Third joint large, a little longer than broad. Arista strongly basally thickened. Micro-pubescent. Face in profile quite concave, the blunt epistoma projecting and the face opposite the

epistoma produced about as long as third antennal joint. The face appears to be pubescent only. Facial strip broad, conspicuous, the crease deep. The occiput visible throughout in profile, rather strongly developed posteriorly on upper part of the head, with a few spinous bristles near the vertex. *Thorax:* convex, very short, setaceous, the bristles appressed. Scutellum quite large, a little more than twice as wide as long, the posterior part subtruncate. The disc a little flattened and a few quite short bristles on the rim. *Abdomen:* quite broad and robust, wider than thorax, a little longer than broad, much concealed by the wings. The pile short, much appressed and setaceous. A stiff surface patch of long bristly hairs very dense in the basal corner of the second segment. *Legs:* the hind femora slender, a little thickened in the middle and with only very short numerous spinous bristles ventrally. Hind tibia over three-fourths as long as hind femora, somewhat thickened posteriorly the hind basi tarsi about as long as remaining joints, and somewhat thickened. It is difficult to ascertain the correct proportions of the legs and their joints, due to the fact that the legs are either uniformly swollen in regular fashion or their contents have shrunken, faithfully reproducing them but with greater thickness. There appears to be a gaseous envelope about these limbs which, however, bears all the spines and bristles and armature and pile of each joint. It is therefore difficult to know whether the dark central contents have shrunken. Nevertheless, the pile and armament can be faithfully and correctly ascertained. *Wings:* with the outer marginal angles of the second posterior cell spurred, its cross vein straight, strongly directed away from wing margin and only a little longer than the last section of the fourth vein, the latter with mere trace of spur. Apical cross vein quite sinuous basally, then sharply drawn out toward tip of wing to join the third vein a short distance before the apex. Third vein and costa end at tip of wing. Vena spuria weak but not faint. Wings light brownish, stigma darker. The anterior cross vein joining the discal cell one-third of the way from base, the cross vein strongly oblique above the vena spuria.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is No. B435 II and the slide is number 2435 (XII 2.200).

Myiolepta luhei Cockerell

"Probable length about 11 mm., wing 9 mm., or a fraction less; legs rather robust, black, with dark hair; a dark cloud traverses the wing

in the region of the forking of the veins 2 and 3, and above and below (the same is seen, less developed, in the living *M. varipes*); and venation agreeing with *M. varipes*, Lw., in nearly all respects. The following table brings out the venational characters:

"Second vein ending much nearer to third than to first.....
M. bella Williston

1. First posterior cell ending almost on margin of wing; outer side of discal cell nearly straight; fourth vein more strongly bent near end of discal cell.....*M. luhei*, n. sp.
   First posterior cell ending some little distance from margin of wing; outer side of discal cell bent inwards; fourth vein less strongly bent near end of discal cell.....*M. varipes*, Lw."

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: Dr. Cockerell says "in the University Museum at Konigsberg." Since I was not able to locate the type of this species, I quote the description of Cockerell above. I believe that this species can be recognized on the basis of the dark cloud upon the wing.

Myiolepta woteni spec. nov.

Female. Length about 6 mm. *Head:* broad, rather less than hemispherical; upper portion of the front rather broad; the ocelli in an equilateral triangle; the pile of front delicate, abundant, pale in color. The face black without tubercle; the antennae blackish, rather large, the third joint about one and one-half times as long as wide. *Thorax:* black, with delicate, erect pile that is pale in color. There are no stout bristles on thorax or scutellum. The scutellum is broad, with an unusually well developed crimped or emarginate rim and only fine, erect, delicate pile. Along the margin the hairs are slightly longer. *Abdomen:* completely obscured by the preservation and the wings folded over it. It appears to be robust, about one and one-half times longer than its width and dark in color. *Legs:* easily seen from one side; black in color; the hind femora considerably thickened, at least twice as thick as the middle of the slightly flattened and slightly arcuate hind tibiae. This thickening of the hind femora is distributed over most of its length and it is narrowed shortly before its apex and base. On the ventral surface of the hind femora there is considerable short, stubby, slightly appressed, black pile but no spines. *Wings:* much of the venation is obscured by the preservation, but the marginal and submarginal, and first posterior cells and lower marginal and subapical cross veins are visible. The marginal cell is widely opened; the subapical

cross vein is long, with a gentle curve in its middle, directed proximally and is confluent with the third vein almost at the apex of the latter at the costa; the angle thus formed is quite acute. The last section of the fourth vein from end of lower marginal cross vein to the beginning of the subapical cross vein is quite long and is as long or longer than the lower marginal cross vein. I see no trace of a vena spuria in the lower portion of the first posterior cell but much of this cell is obscured and there may have been a fold or a trace of one in the proximal portion.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: one specimen no. 9080 in the Museum of Comparative Zoölogy: Haren collection.

This species appears to be distinct from others on the bases of the venation and the hind femora.

Genus Sericolepta genus nov.

Head: very large. Eyes strongly separated in the female. Front prominent, flattened, somewhat concave. Arista short, third joint large, a little longer than broad. Arista somewhat longer than the antennae, basally thickened, pubescent. Face deeply concave below the antennae, but the face itself is little produced. *Thorax:* longer than broad, convex, scutellum large, semicircular, its disc and margin convex, not thinned or impressed. *Abdomen:* quite robust, wider than the thorax, widest on the second segment. *Legs:* hind femora stout and elongate, a little the widest in the middle but not very narrowed either basally or apically, the ventral outer half equipped with many spines, much more than in *Myiolepta*. Tibiae about four-fifths as long as femora, stout and ending transversely. *Wings:* with marginal cross vein very long, the outer one strongly sinuous, joining the third vein some distance from the end of the wing. Vena spuria weak, anterior cross vein approximately one-third of the way from base, but quite oblique.

Genotype: *Sericolepta maculata* spec. nov.

This genus is, I believe, a well marked one; though it is like *Myiolepta* in many respects, the confluence of the very sigmoidal apical cross vein some distance from the tip of the wing is quite unlike that of the modern species of *Myiolepta* in the strict sense. Moreover, this is an exceptionally large species, over twice as large as present-day *Myioleptas* and without the flattened somewhat impressed scutellum found in *Myiolepta* or the appressed setaceous pile. It is worthy of

note, however, that two of the species that I describe and leave for the time being under *Myiolepta*, namely *andreei* and *germanica*, are somewhat like the present species in that the apical cross vein does not joint the wing at the tip and they are unlike both the present form and *Myiolepta* in lacking any spines on the femora. *Myiolepta valida*, appears to be a true *Myiolepta* beyond doubt. These other species and subgenera, it seems to me, we must regard as more highly developed inasmuch as the apical cross vein confluence point has moved more basalward.

SERICOLEPTA MACULATA spec. nov.

Plate 11, fig. 84, 85, 87; Plate 12, fig. 100, 109, 110; plate 13, fig. 119

Female. Length 13 mm.; length of wing 10 mm. *Head:* very large, wider than thorax. Eyes conspicuous, thickest somewhat away from the middle when seen from above. Front wide; eyes widely separated, nowhere approximated. The front flattened, somewhat concave, pilose only on the upper half. Somewhat protuberant at the level of the antennae. Antennae about the middle of the head in profile, short; third joint large, half again as long as wide, slightly pointed apically though the end is actually rounded. The arista elongate, less than half again as long as antennae, basal half strongly thickened and pubescent. The head from above, behind the eyes quite concave. The occiput at the top well developed, but not thicker than it is on the sides, with much long delicate pile and four or five spines that do not begin until near the middle of the head. Face below the antennae strongly concave, the epistoma bluntly protuberant. *Thorax:* very broad, somewhat longer than wide, thickly covered with very delicate erect pile. The scutellum large, semicircular, very convex with a few slender stiff hairs posteriorly, nowhere with macrochaetae. *Abdomen:* half again as long as wide, very broad and robust, the second and third segments black with large quadrate brownish yellow spots in the basal corners widely separated in the middle. The fourth segment appears to have been wholly dark, but it is difficult to say for sure. Abdomen thickly erect, long, delicately pilose at least on the basal half. *Legs:* hind femora stout and long, rather thickened especially right in the middle. On the basal half the hind femora are brownish yellow; on the outer half black, the outer half ventrally with very numerous short spines not confined to a single row. Hind tibiae rather stout, less than four-fifths as long as the hind femora, ending transversely. *Wings:* very long, considerably longer than abdomen. The marginal cross vein quite long, the lower one slightly sinuous, the outer one strongly

sigmoid joining the third vein some way from the tip though not remotely and the third vein and costa ending at tip of wing. The basal marginal angles of the first and second posterior cells with spurs. The vena spuria weak, but visible throughout. The small cross vein oblique above the vena spuria, and entering the discal cell about three-sevenths of the distance from the base. Wings uniformly brownish. Stigma darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum of Konigsberg. The number on the specimen is 2B642 and on slide is 2642 and 229.

Genus Archalia genus nov.

Head: large. Eyes small. The antennae are not well preserved; short and the third joint short and rounded. Face below the eyes extensive apparently and in profile retreating below the antennae. There is no evidence of a tubercle. *Thorax:* short and broad and robust. Scutellum large, apparently semi-circular. *Abdomen:* thick, convex posteriorly, very robust and with the terminal part broadly rounded in what is probably a male hypopygium. *Legs:* hind femora particularly short and massive, much as in the *Syritta* of today of an altogether different subfamily. Ventrally before the apex there are many small setae. *Wings:* venation well preserved. Small cross vein quite basal the vena spuria strong and the apical cross vein very sigmoid, and confluent with the third vein some distance from the tip of the wing. Third vein and costa join the wing margin at the tip. Marginal cell broadly open.

Genotype: *Archalia femorata* spec. nov.

This appears to be an unique fly. In general it is well preserved, the legs and wing particularly well preserved. The profile and details of the antennae are poor. This is the specimen which Williston (1886) referred to as related to *Myiolepta*. However, this relationship does not appear to be at all close. The anterior cross vein more basal, the confluence point of apical cross vein quite different and the massive femora make it unrelated. Its dark coloration and basal cross vein throw it into the Cheilosinae.

Archalia femorata spec. nov.

Plate 3, fig. B; Plate 4, fig. 10, 11

Male (apparently). Length 8.2 mm.; length of wing 5.6 mm. *Head:* the specimen is placed laterally and a fairly good profile shows. The

head is broad and short, and the front is round and bulging or prominent despite the face that it is extremely short and steep. The specimen, which is almost certainly a male had the eyes holoptic and the upper facets are enlarged. Below the antennae the face appears to be produced ever so little as a steep shallow convexity and then to retreat to the oral margin. The most remarkable peculiarity about the species seems to be the small eyes, leaving the cheeks and occiput well developed. The antennae were short, the first and second joints subequal, together a little longer than the third, and the third joint short and rounded. There is only an extremely faint indication of an arista. *Thorax:* dark in color. No details can be made out. The scutellum is short, smooth rimmed and quite broad. No pile or bristles appear. *Abdomen:* short and broad and dark in color, presumably without pattern, though this cannot be ascertained with certainty. Five visible segments and a large hypopygium. On the third segment there are traces of thick, moderately short hair. *Legs:* hind femora enormously thickened, about as in *Syritta*, with the same stoutness and type of thickening apparent in that genus. There is a double row of short heavy setigerous spinules along a ventral flange on the posterior two-fifths of the hind femora. At the point where these begin, the two-fifths way point, there is the not uncommon obtuse, outward production. The hind tibiae were very slender and closely applied to the femora, and were bent near the middle to correspond with the above mentioned production of the hind femora. The other femora and tibiae were slender. The legs appear to have been dark in color. *Wings:* characterized by widely open submarginal cell and practically straight third longitudinal vein with only the merest of sinuosities. The subapical cross vein is beautifully and strikingly sigmoid. The veins were quite heavy, and wing clear, and reaching a little beyond the tip of abdomen. The third vein joins the costa at the tip of the wing, and the first longitudinal vein joins the costa at an angle of about seventy-seven degrees.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3941, in the Museum of Comparative Zoölogy. (Scudder Collection).

Genus Palaeoascia Meunier

Ann. Soc. Ent. France for 1893, 259 f. (1893). Ann. Soc. Sci. Bruxelles, **19**: 7 (1895)

Head: large, subglobular. Eyes occupying most of the head; broadly holoptic in the male. Front small, a little bit convex. Antennae short,

located in the middle of the head in profile, third joint not large. Arista a little longer than antennae, basally thickened. Face below antennae with well developed but small tubercle. Face below the tubercle descending a short distance to the epistoma, which is not more produced than the tubercle is. The occiput extensive throughout in profile in contrast to *Palaeosphegina*. *Thorax:* longer than broad, very convex, with a few short spines on the sides above the wings as in *Palaeosphegina*. Scutellum hemispherical, rather considerably broader than long, the apex with a single pair of widely spaced very strong tuberculous bristles and occasionally with a smaller pair on the outside. *Abdomen:* elongate, about two and one-half times as long as wide, rather thick, and somewhat convex on the surface, covered with somewhat scattered short appressed bristles. Male hypopygium large and rounded. *Legs:* the hind femora elongate, a little thickened especially on the dorsal surface, somewhat more slender than in *Palaeosphegina* in the males, with a double row of very long slender sharp pointed spines which reach practically to the extreme base of the femora. The outer lateral surface of the hind femora just past the middle with two to four similarly long sharp spines. Hind tibiae sometimes with a few spines near the middle of the outer surface. Absent in the type. *Wings:* with the venation very much like that of *Palaeosphegina;* so much so that I am at a perfect loss to find any difference not covered by the extreme venation of that genus. However, the wings of *Palaeoascia* do not seem to be quite so variable as *Palaeosphegina;* on the other hand they appear to be larger for the respective size of the insect.

Genotype: *Palaeoascia uniappendiculata* Meunier.

The genus constantly differs from *Palaeosphegina* in the matter of the swollen and tumid occiput. In addition the hind femora of the male is spinose on the basal half as well as distal half, the lateral femoral spines are constant in *Palaeoascia* but I believe that they sometimes occur in *Palaeosphegina* but rarely.

Palaeoascia uniappendiculata Meunier

Plate 5, figs. 16–20; Plate 7, figs. 43–48; Plate 8, fig. 51

Jahrb. Preuss. Geol. Landesanst., **24**: (2) 201. (1904)

Male. Length 5 mm.; length of wing 4 mm. *Head:* front, vertex, face and occiput flat, the front and the upper part of the face quite thickly pilose and this is in contrast to *Palaeosphegina*. The antennae located below the rather convex front, directly in the middle of the

head, are short, the third joint is about one and one-half times as long as wide with bluntly rounded apex and the color, including the arista, light reddish brown. *Thorax:* dorsum of thorax black. Scutellum reddish, the pile of the former is sparse but more abundant than that of *Palaeosphegina*, is quite erect and light in color. *Abdomen:* pigment of abdomen is destroyed in one type and largely obscured in another; in the third specimen the whole color is somewhat pallid, perhaps teneral. Nevertheless it is easily possible to see that the abdomen is banded with dark brown or black on the bases of all of the segments and a little bit more narrowly on the posterior margins. In one specimen, No. K5098, the whole of the terminal segment appears to have been black. *Legs:* hind femora definitely black on the basal half in specimen No. 2407K, and the base of the femora in this one yellow, the base of the tibiae, the basal two-thirds of the remaining tibiae and all of the fore and middle tarsi pale yellow. In the other specimens the color of the legs is somewhat uncertain and the femora appear to have been unicolorous.

Of the females it may be said that the front near the vertex is much narrower, as can be seen from Plate 9, fig. 35.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Types: in the University Museum at Konigsberg, from Baltic amber.

One male, No. K5098, 72247 (K5098-Klebs); another male which I judge is a type as it is labelled in Meunier's handwriting, but the number is not one of those given by him,—No. 2497k (2407-Klebs); and two females No. Z2086, K2631, (2631-Klebs); and 21692, K263B (2632-Klebs). The following twenty-six females have been determined as belonging to this species: No. B14 (14649-Klebs); No. 11B856 (2856, VII. 2.282-Klebs); specimen unnumbered (V); unnumbered (O); unnumbered (P); unnumbered (Y); unnumbered (I); No. 3345 (345,VII. 2.217-Klebs); No. XX134676 (24676-Klebs); No. B 19985(G); No. B446D (2446-VII. 2. 210-Klebs); No. B433 (433-VII.2. 212-Klebs); No. 5B393 (393 VII.2.209-Klebs); No. IIB546 (2546 VII. 2.202-Klebs); No. XB4555 (24555-Klebs); No. X127 (unmounted); No. X151 (unmounted); X144 (unmounted); X337 (unmounted); K 1930 (unmounted); K1939 (unmounted); K1984 (unmounted); No. 11 B 369 (2869); No. B 14681 (14681); No. B 4683 (24683) (front of this specimen very narrow at the top); unnumbered (Q) (I find this an extremely small specimen, which may be a distinct species. Length 4 mm.). The following ten males belong here: No. 3B593 (3995 VII 2.457-Klebs); No. 3B404 (3494 VII.2.219-Klebs); No. 492 unmounted) No. IIB363 (H 109); No. 11B785 (12785-Klebs); X4485, XB (4485-

Klebs); B14678 (14678-Klebs); unnumbered (W); No. 11B899 (2899 VII. 2.220-Klebs); No. 11 B 656 (2656).

In the Geologisch-Palaeontologisches Institut and Museum der Universitat Berlin are seven females as follows: T. M. B. 3 (H 201); specimen unnumbered (H 202); T. M. B. 10 (H203); 2 (H 206); 4 P.M.B. (H-208); P. M. B. 5 (H-207); P. M. B. 6 (H-210).

In the British Museum of Natural History are two females: no. 22194 and 22196 from the Loew collection, marked Miocene amber and with his label of 'Syrphici', and one male No. 22197 with the same designation, except the accompanying slip marked '*Syrphus*'.

Palaeoascia uniappendiculata brachypennis var. nov.

Female. This specimen I designate as a variety of *Palaeoascia uniappendiculata* on the basis of the broader and shorter wing, the proportions of which differ. The subapical cross vein is more sigmoid and the wing is a little bit more brownish. The legs are uniformly darker in color, nowhere light yellowish. Facial tubercle black. Pile of front not thick.

Holotype: in the University Museum at Konigsberg. No. B395 (395 VII.2. 216-Klebs).

Palaeoascia uniappendiculata obtusa var. nov.

Female. Length 3.5 mm.; length of wing 3.2 mm. In this form the tubercle of the face, while present, is so extremely blunt and perfectly straight between tubercle and antennae, suggesting the manner in which it is formed in *Palaeosphegina*, that I think it merits varietal distinction.

Holotype: a specimen in the University Museum at Konigsberg. The specimen itself is without number; the slide is No. 403 VII. 2. 210 Klebs).

Palaeoascia atrata spec. nov.

Plate 5, fig. 21–24.

Female. Length 5 mm.; length of wing 4.3 mm. *Head:* this is a very black species sharply distinguished, in addition to the jet black coloration of the entire face, tubercle, antennae and head, by the much more thickly and somewhat long pilose front and vertex. The face also appears to be more pilose and especially below the tubercle and

on the sides. The arista is strongly swollen on the basal fourth but not sharply swollen. The third joint of the antennae is at least half again as long as wide, perhaps a little more broadly rounded. *Thorax:* jet black, scutellum almost as dark. *Abdomen:* banded but quite dark, the basal fascia occupying nearly a third of the segment and no apical fascia on the fourth and fifth segments. *Legs:* dark brown or black. *Wings:* deeply tinged with brown throughout.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is labelled B27261 (B27261-Klebs). Paratypes: a specimen unlabelled, slide No. 'B', Konigsberg; another specimen a male, British Museum of Natural History. No. XIII B327 (13327–353 In 18666).

I associate the following four specimens from Konigsberg with the species *atrata,* basing my conclusion on the similar blackish color, dark brown wings, long bristly pilose scutellum and thickly pilose front and blackish antennae. Two of them are males as follows: No. 11B885 (2885 VII. 2.197–Klebs); without number on the specimen (H 110–Klebs). The two females bear these numbers: the first XIIB788 (XIIB788); the second, lacking number on specimen but with the affixed letter of X, 2H111).

There is a large male, No. 3B620, which I believe is abundantly distinct from *atrata,* but because of the great variability of these flies, I prefer to leave it under *atrata* for the present. In the first place the antennae are much shorter, dark brownish, the third joint scarcely longer than wide, obtusely rounded, very thick and long pubescent. The arista sharply swollen on the basal fifth. The face and head everywhere jet black, the front rather thick, long pilose. The tubercle prominent, concave, and face above tubercle very hairy. Thorax and scutellum jet black and the scutellum in particular, in addition to the strong pair of heavy long spines, has a number of stiff, quite long black bristles on the disc. Its length is 5.2 mm.; of wings 4.2 mm.

The full number of this aberrant specimen which is in the University Museum at Kongisberg is No. 3B620 (3620 VII. 2.456 Klebs).

Palaeoascia nigra spec. nov.

Plate 7, fig. 49

Female. Length 4.8 mm.; length of wings 4.2 mm. *Head:* this specimen is distinguished by the very black coloration, sharp prominent tubercle on the face, the third antennal joint is one half again as long as wide, but is light reddish brown. This arista swollen on the basal

fifth rather sharply. The pile of the front is fairly long but certainly not as thick as found in *atrata* and the pile of the face is very sparse indeed. *Thorax:* jet black. Scutellum with only two strong spines and no long stiff bristles on the dorsum. *Abdomen:* is sharply banded with black on the third and fourth segment, and on the apex of the second segment and the base of the fifth segment. *Legs:* hind femora small, quite short, evenly thickened above and below but mostly in the middle, a little spindly at base with only two lateral spines and these are near the apex and very long and stiff. Only the apical third or two-fifths at most, of the hind femora are black and only the distal two-fifths of the hind tibiae. The middle femora pair of legs are entirely light yellowish brown and the anterior pair practically the same.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is unnumbered, the slide is No. (N. H108).

Genus Spheginascia Meunier

Allg. Zeitschr. Ent. (B) **6**: 71. (1901). Jahrb. Preuss. Geol. Landesanst., **24**: (2) 205 (1904)

Small sized flies with a robust abdomen much like *Cheilosia.*

Head: large, eyes conspicuous, broadly touching in the male. Vertex and front long bristly, the latter with a deep median crease. Antennae short, third joint half again as long as wide, broadly rounded, very short pubescent, the arista quite long, thickened on the basal third but not abruptly, the apical bristles of the second segment quite long. Front above the antennae in the male convex. Face below the antennae in the male for a short distance concave, then rising to a strong and prominent bulge, broadly rounded. This bulge or broad tubercle descends equally abruptly to the epistoma. Face nowhere deeply produced. Face in the female below the antennae concave, only without the tubercle. The epistoma a little bit thrust forward, sharp at the edge. Occiput visible in profile only in the female. *Thorax:* scarcely longer than broad, convex, long sparse pilose. Scutellum at least twice as wide as long, the margin almost semi-circular, the disc and rim convex, although the scutellum is not thick. *Abdomen:* twice as long as wide, widest at end of second segment, barely less than half as wide at the end of fourth segment. Hypopygium large, broadly rounded from above. Abdomen rather long pilose, especially on the sides. *Legs:* hind femora slender, long bristly pilose on the sides and above and ventrally with many long stiff bristly spines, sharp pointed but

nowhere thick, not definitely confined to rows. *Wings:* characterized by the marginal cross vein being strongly and obliquely directed away from wing margin. Apical cross vein a little bit sigmoid joining the third vein remote from tip; never recurrent. Both the marginal angles of the first and second posterior cell with long spurs. Vena spuria present.

Genotype: *Spheginascia biappendiculata* Meunier.

Spheginascia biappendiculata Meunier

Plate 7, Fig. 50; Plate 9, Fig. 61, 66, Plate 10, Fig. 70, 71

Jahrb. Preuss. Geol. Landesanst., **24**. (2) 205. Pl. 13, fig. 4 and 5 (1904)

Male. Length 5 mm.; length of wing 4.5 mm. *Head:* eyes large, bare. The face, front and vertex dark brownish black. The antennae and arista very dark brown. The arista is strongly thickened on three-fourths of its length, more so at base. The pile of the front and face is black. *Thorax:* is black with some evidence of having been aeneus in life. The bristles on the dorsum of the thorax are very long, scattered and delicate on the upper part of the pleura. Before the wing there are several long stout stiff bristles and a few others on the posterior calli. They are not to be compared to the stiff spinous bristles of flies in the living genus *Ferdinandea.* The scutellum black, with two pairs of long stiff tuberculous bristles near the apex and some long, very sparse, slender, bristly hairs on the disc. *Abdomen:* uniformly dark brown, perhaps a little bit darker on the posterior segments of the abdomen and a little bit lighter on the dorsal half. Abdomen a little wider than thorax, the pile quite sparse but conspicuous, long and bristly. *Legs:* hind femora dark brown, a little lighter near the apex. All the tibiae dark apically and light yellowish brown basally. All the tarsi brown or fuscous.

Female. In the female the eyes are unusually broadly separated and the face is concave.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Types: in the University Museum at Konigsberg. One male, No. Z3874 (K2549, Z3874-Klebs). One female No. K4233, Z587 (K4233-Klebs). Paratypes: there is one male in the Geologisch Landesmuseum, Berlin from Baltic amber with no number on the specimen, the slide bearing the number (101).

I have determined the following specimens from the University Museum of Konigsberg: four males—No. 111B366 (3266 VII.2. 195-

Klebs); one specimen unlabeled, slide bearing the letter M, I affix the number H 112. No. IIB468 (2469 VII.2.250–Klebs); 11B563 (2563 VII. 2.203–Klebs). Six females—No. SB368 (368 VII.2.208–Klebs); No. 547 (unmounted); No. XB6335 (26335–Klebs); No. XIIIB311 (13331–(Klebs); No. X60 (unmounted; and one specimen without number, the slide bearing the number (13548 VI, 22, 7781–Phys. Oek. Ges.).

In the Geologisch-Palaontologisches Institut und Museum der Universitat, Berlin there are two females—No. 9 (H 205); and No. 7 P M B (H 209), and one male No. H 211. The British Museum of Natural History has three females—No. 22200, 22201 and 22202, which are from the Loew collection. In the American Museum of Natural History one Male No. 502–129.

Spheginascia biappendiculata rectinervis var. nov.

Male. Length about 5 mm.; wings 4.5 mm. This variety differs from the typical form in respect to the venation of the wing and the details of the scutellum. The scutellum has three pairs of strong, long, black bristles on the margin and one or two pairs of shorter ones near the base on each side. In the wing the angle formed by the lower marginal cross vein with the last portion of the fourth longitudinal vein is considerably more obtuse, the last section of the fourth longitudinal vein between the two cross veins is straight instead of curved downward, as is also the lower marginal cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: one specimen no. 9076, in the Museum of Comparative Zoölogy (Haren collection).

Genus Pseudosphegina genus nov.

Head: broadly subglobular in the male with the eyes narrowly separated a distance a little more than the width of the third antennal joint; no where approximated. Anterior facets a little enlarged. Eyes bare, the antennae set above the middle of the head in profile, small, the third joint a little longer than wide. Arista short, basally thickened and bare. Face below the antennae straight for a distance down to the conspicuous tubercle which lies nearly opposite the level of the bottom of the eyes. Face past the tubercle abruptly retreating, to the epistoma. Cheeks quite small. Occiput not visible in profile. The flanges of the lower part of the posterior surface of the occiput very

strong and conspicuous. *Thorax:* a little longer than wide, somewhat convex, almost bare with a few scattered short bristles. Scutellum small, wider than long, nearly bare with two strong apical bristles and a weaker pair on either side of these. *Abdomen:* elongate, about three times as long as wide, relatively thin at base and considerably thicker at apex due to the development of the hypopygium and genitalia. *Legs:* hind femora quite simple and slender with five or six well developed, spines ventrally on the outer half. *Wings:* rather longer than abdomen, not wider at base than in the middle. Apex somewhat rounded, the venation quite like that of modern *Sphegina* except that the vena spuria is quite absent.

Genotype: *Pseudosphegina dichoptica* spec. nov.

The genus *Pseudosphegina* is certainly of peculiar interest because it is in every way like modern *Sphegina* except that the face is tuberculate, whereas in all living *Sphegina* the face is concave and the face thrust forward. The genus *Palaeosphegina* of Meunier is somewhat misnamed for it is even less like modern *Sphegina;* in addition to having the face tuberculate the males were strongly holoptic and as is well known, the true *Spheginas* have only dichoptic males. Thus, out of the four possible combinations three of the combinations are known to have developed. Two of these exist as fossils. The third form *Sphegina* is not known positively to exist as a fossil, although I have placed a specimen in the genus *Sphegina* from the Florissant, from which specimen it can not be discerned whether the face is tuberculate or developed as it is in modern *Sphegina.* It may well be that the specimen of the Colorado form that I have placed in *Sphegina* is a true member of that genus but we must wait for other specimens to know what its face is like. The known combinations of face and eyes are as follows:

a. Face tuberculate; males dichoptic (*Pseudosphegina*).
b. Face tuberculate; males holoptic (*Palaeosphegina*).
c. Face non-tuberculate; males dichoptic (*Sphegina*).

Pseudosphegina dichoptica spec. nov.

Plate 6, Fig. 27–28; Plate 7, Fig. 38, 39

Male. Length 5.5 mm.; wings 4 mm. *Head:* the face, front and vertex black. Antennae and arista black, third joint of antennae a little pointed at apex, one and one-half times as wide as long. Arista half again as long as antennae, the pile of the occiput short, confined to a single row of collar-like bristly hairs. *Thorax:* black, pleura brownish,

the dorsum of the thorax exceptionally sparsely pilose, with only a scattered bristle here and there. Scutellum black, abdomen with the second, third and base of the fourth segment dark brownish, the remainder of the abdomen and the prominent rounded hypopygium shining black. Apical portions of genitalia light brown. *Abdomen:* everywhere thickly appressed bristly. Bristles of hypopygium erect and short, the last sternite thick bristly, the preceding ones with very few bristles. *Legs:* hind femora blackish brown on the apical half, paler brown basally, the outer half with a few stiff appressed bristles and five or six long stiff sharp pointed bristles ventrally. *Wings:* with the marginal angles of the first posterior cell long spurred, the corresponding angle of the second posterior cell with a merest trace of a spur. The lower marginal cross vein almost joining fourth vein at right angles, and last section of fourth vein before the origin of the apical cross vein quite long, longer than the apical cross vein itself. Apical cross vein somewhat curved or sigmoid, on its outer half joining the third vein at right angles, the last section of the third vein about five-sixths as long as subapical cross vein. Third vein and costa end at tip of wing. Wings uniformly pale brownish, the stigma darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The amber bears no label. The slide upon which it is mounted bears the label of 'J'. I affix for future designation the number H 101 to the slide.

Pseudosphegina withersi spec. nov.

Plate 11, fig. 81, 82; Plate 13, fig. 115

Male. Length 6 mm.; length of wing 4.7 mm. *Head:* large, much wider than thorax. Eyes extensive, very narrowly separated indeed, more so than in dichoptica. Front and vertex and occiput, except narrowly below, dark in color. Face, antennae and cheeks light yellowish brown to brownish orange, the face a little darker, the arista quite pale yellowish. Tubercle well developed, pile of head everywhere pale, including the finely pilose occipital fringe. *Thorax:* convex, dark in color apparently aeneous, almost bare. Scutellum with two very stiff thick apical bristles; smaller bristles apparently absent and the dorsum almost bare. *Abdomen:* dark on the first and almost the whole of the second segment except for the apical band. Anterior half or more of third segment dark and the whole of the terminal segment. Hypopygium particularly large and broad and dark. Abdominal pile pale. *Legs:* hind femora brown, darker apically with few black spines,

four of them exceptionally long. Distal three-fifths of the hind tibiae dark, the whole of the middle pair of legs and all of the front pair of legs except the anterior basal two-thirds of the fore femora light yellowish brown. *Wings:* distorted but the apical cross vein very slightly curved and the last section of the fourth vein definitely curved outward slightly.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the British Museum of Natural History (Loew collection). The specimen is unnumbered, the box No. (22270).

Genus Palaeosphegina Meunier

Jahrb. Preuss. Geol. Landesanst., **24**: (2) 204. (1904)

Head: broadly hemispherical, the eyes extremely large occupying almost all of the head, broadly touching in the male, rather widely separated in the female, the width of the front above the antennae not quite twice as wide as width across ocelli. Ocelli at top of head in a nearly equilateral triangle. Front with only a very few scattered hairs and a small rounded convex tubercle above the antennae. In profile the back of the head from the ocelli down to the vertical portion of the head is very broadly rounded, the antennae are barely situated below the junction of the middle and upper thirds of the head. Antennae short, third joint large. Arista not quite twice as long as antennae, very slender at tip, strongly thickened at base. Face with a prominent tubercle that descends below a little bit more abruptly than the rise of the tubercle above. The tubercle is almost opposite the lower third of the eyes. Face very little produced below the tubercle, scarcely as long at the point of junction of cheek and face as the width of the third antennal joint. The occiput scarcely visible in profile but somewhat narrowly below, equipped with an occipital collar or fringe of pile of several rows of hairs. *Thorax:* barely longer than broad, very convex; it is practically bare or with scattered short hairs. The scutellum is large, semicircular, convex on disc and rim, with two to six very strong long bristles on the rim, the outer ones shorter. The scutellum seems to vary considerably in shape from circular to obtusely pointed. *Abdomen:* elongate, about three times as long as wide, widest distally on the fourth segment, the abdomen being spatulate rather than petiolate in most of the forms, sometimes flattened and again strongly convex. The pile of the abdomen is appressed, short bristly; the metanotum is conspicuous. *Legs:* the hind femora are always elongate, always a little thickened and this thickening is usually

past the middle; occasionally it is in the middle (specimen No. X 153). Without exception the distal ventral half of the femora is equipped with a double row of sharp stout long spines, and it should be noted that these spines never encroach on the basal half except as very slightly overgrown appressed bristles in contradistinction to *Palaeoascia*, in the male of which the spines are as strong on the base as they are apically. This is far from being an important difference, but it is one distinction between the two genera and I think it shows three things:

A. That the spinal armament originated from ordinary bristly setae.
B. That it began at the tip of the femora in all cases and moves basalward in a varying degree.
C. And lastly, that it has enjoyed a much greater impetus of development in the male sex.

The hind tibiae end transversely; the middle tibiae end with a series of blunt stout spines of which one is sometimes much longer and stouter. Wings: varying from elongate and slender to quite broad and short. There is always this uniform feature of venation that the marginal cross veins are strongly obliquely directed away from wing margin, leaving the last section of the fourth vein before the end of the wing, varying over one hundred per cent but never recurrent. Sometimes the apical cross vein is perfectly straight; more often sigmoid and occasionally quite strongly sigmoid. The vena spuria is absent but it must be remembered that it is quite faint in present day *Spheginas*. The males differ in no essential particular from the females, except for the strong holopticism, the prominent hypopygium and genitalia resulting in a little more petiolate abdomen.

Genotype: *Palaeosphegina elegantula* Meunier.

Palaeosphegina elegantula Meunier

Plate 9, fig. 63–65

Jahbr. Preuss. Landesanst. **24**: (2) 204, Pl. 13, fig. 2 and 3. (1904)

Female. Length 8 mm.; length of the wing 6.2 mm. *Head:* face, front and cheeks dark coppery brown to black. Antennae and arista light orange. The facial tubercle is large, evenly rounded, not quite as much produced as the cheeks. Occipital pile dense and light brownish in color. The third joint of antennae is one and one-fourth times as long as wide. *Thorax:* dark coppery brown or reddish above; there are faint indications of a trivittate condition. Scutellum brownish red,

lighter than the mesonotum, the spines of the thorax above the wing are quite short, the pleura are lighter in color. *Abdomen:* is light reddish or orange brown in color, in the type obviously banded but in this specimen the wings are matted over the abdomen and largely obscure it. Data taken from other specimens show that the basal part of each segment contains a narrow black or dark brown band of variable length and interrupted in the middle in more or less variable fashion. Sometimes the posterior portion of the segment is very narrowly dark fasciate as well but not interrupted. Hind femora dark reddish brown, nearly black on the outer half, much lighter in color on the basal two-fifths or half and very narrowly just before the apex. The hind tibiae a little darker on the distal half. All the tarsi reddish, the middle tibial spurs contain one very long stout spine. *Wings:* of average length in contrast to the extremes. The marginal angles of the first and second posterior cells both with very short spurs, or the distance from the confluence point of the apical cross vein to the end of the wing is about four-fifths as long as the apical cross vein. The last section of the fourth vein before the origin of the apical cross vein is longer than the apical cross vein. These remarks are chiefly taken from the type specimen on which the species is primarily fixed and I have indicated in the discussion of the genus the principal nature of the variations which are encountered in the individuals of this genus. There are probably several species involved in this complex, but in view of the tremendous variability I have had very little success in isolating these and in correlating the numerous differences. I prefer to leave them for the present as a group of variable individuals.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: in the Preussische Geologische Landesanstalt in Berlin. The specimen, labelled G. L. 99, was studied. There is supposed to have been another type at the University of Konigsberg, which, however, I was not able to locate; but there certainly were other numerous specimens in their collections, all of which I have before me at time of writing. These total thirty-three specimens not including one each of two varieties nor the specimen of uncertain determination.

The specimens from the University Museum at Konigsberg are as follows:

Females, specimen IIB857 (2857 VII. 2.284-Klebs); No. 14708 (14708-Klebs); No. B901 (VII. 2. 217-Klebs); No. B14285 (14285-Klebs); No. IIB662 (2662.Vii.2.287-Klebs); No. X122 (unmounted); No. X161 (unmounted); No. X120 (unmounted); No. X164 (unmounted); X529 (unmounted); No. X 124 (unmounted); No. K2416-

343 (unmounted); No. X IIB786 (13786-Klebs); No. 16562 (16562); No. XB4365 (24365-Klebs); No. 14287; No. K 7871; the following nine specimens have no number of the specimen but the slides are designated thus: No. (E); (R); (H); (A): (340); (H 106); (T); (Z); (L). Seven males: No. IIB915 (2915 VII.2.195-Klebs); No. IIB900 (2900 VII.2.922-Klebs); No. X153 (unmounted); No. X 331 (unmounted); No. X 336 (unmounted); No. X111B228 (13228-Klebs); no number on the specimen, the slides labeled (U). There is also at the Geologische-Palaontologisches Institut und Museum der Universitat Berlin one male No. T. M. B. (H 204), and one female at the British Museum of Natural History No. XIIIB229 (13229, 351, In 18664), and one female at the American Museum of Natural History; all of these have been studied by me.

With regard to the following specimen, No. B14138 (14138-Klebs), I cannot positively decide whether or not it is a male or a female; if it is a female it would go into the genus *Paleosphegina* since it is definitely dichoptic. Should it be a male, on the basis of the hypopygium (which is obscure) it would go into the genus *Pseudosphegina*. The evidence which is available from the terminal portion of the abdomen indicates a female. Specimen at the University Museum, Konigsberg.

Palaeosphegina elegantula tristis new variety

Female. I designate this as a variety based on the extremely narrow front. The antennae are dark brown and the quite short arista sharply thickened on the basal third. The front and vertex are almost black; scutellum black; the legs dark brown, with the tarsi somewhat lighter. The hind tibiae pale on the basal half.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: specimen without number in the University Museum at Konigsberg; the slide is numbered F H107.

Palaeosphegina elegantula atrox var. nov.

Male. Size large. *Head:* face, front and cheeks jet black. First antennal segment black, third very dark brownish. Arista sharply and heavily thickened on the basal fifth and quite pubescent on the basal fifth. *Abdomen:* with first two segments and the base and apex of third and of all the very long fourth segment and basal part of hypopygium jet black. The third segment has a very brown yellowish band. *Legs:* the hind tibiae sharply jet black only on the apical third. Hind

femora jet black past the middle except narrowly at the apex. Remainder of the legs entirely pale yellowish.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: specimen in the University Museum at Konigsberg, number 11B891 (2891 VII.2.215-Klebs).

Palaeosphegina pilosa spec. nov.

Female. Length 5.2 mm.; length of wing 4.2 mm. *Head:* very large, much wider than thorax; everywhere, face antennae and the arista jet black. The pile of front pale brownish, nowhere thick. Face apparently with a little short pile above the tubercle. Tubercle rather large, formed as in *elegantula*. *Thorax:* and scutellum shining jet black. Pile of both of these very sparse, nearly bare, a few long black bristles before the wing, and scutellum, with two pair of unusually thick stiff bristles which are long, the inner pair widely spaced, and in closing a pair of very short bristles. Outer pair shorter. *Abdomen:* broadly petiolate, jet black with black appressed short bristles. *Legs:* everywhere jet black, the bristles on the femora confined to the apical half, one long and one short bristle on the outer lateral surface of the hind femora, a short distance from the end. *Wings:* very brownish. Stigma extremely dark. Apical cross vein rather sigmoid, both the marginal angles of the first and second posterior cells spurred.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg, number B331 (331 VII 2.206-Klebs).

This species has the occiput and facial tubercle quite as expected for *Palaeosphegina*. It is a slightly smaller species, the form a little bit more suggestive of *Palaeoascia* and the lateral femoral spines suggest *Palaeoascia*. From *elegantula* Meunier it is at once distinct in the totally black coloration, besides the smaller size and the arrangement of the spines on the scutellum.

Palaeosphegina baccha spec. nov.

Female. Length about 4 mm. *Head:* large, considerably wider than thorax; hemispherical in shape; the occiput slightly swollen when viewed laterally and broadly pilose. The vertical posterior ocular margin straight and not indented. Ocelli set in approximately an equilateral triangle; the smooth, short pilose front widening gently down to the antennae which are set above the middle of the head in profile. There is a small tubercle on the face below the antennae. The

first and second joints of the antennae are quite short, the third joint is broadly rounded, a little longer than wide with a slender dorsal arista that is slightly thickened on the basal third. *Thorax:* black, sparsely short pilose, scutellum of the same color, with a pair of rather widely separated blackish bristles which are about as long as the length of the scutellum. *Abdomen:* elongate and rather flat, slightly crumpled. Five segments are present; the third, fourth and fifth have a dark colored transverse band or fascia lying across the base of the segment, its width comprising about two-fifths the length of the segment. Upon the third segment the lateral width of the fascia appears to occupy a little more than half the length of the segment and on this same segment the fascia appears to be interrupted in the middle truncately. The nature of the first and second segments can not be ascertained. *Legs:* light brownish yellow in color, the hind femora are simple and slender. *Wings:* the apical third of both wings is destroyed. From the remainder, the venation can be described as follows: a wing suggesting *Palaeosphegina* in the absence of the spurious vein and in that the last section of the fourth vein is quite remote from the subapical cross vein, in fact, almost recurrent; the lower marginal cross vein is quite straight, making a right angle with the last section of the fourth vein and about a 70 degree angle with the fifth vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: one specimen no. 9029 in the Museum of Comparative Zoölogy (Haren collection).

There can be very little doubt of the family affinity of this specimen, although the disposition of the subapical cross vein and of the second and third longitudinal veins can not be determined. The preserved portion of the right wing is a little greater and a little longer than that of the left one and is truncated obliquely from along the costa just at the end of the first longitudinal vein. All of the outer half of the subcostal cell dark brown; the venation of this wing is not greatly different from that of other specimens of *Palaeosphegina* except that the discal cell is very much longer than usual; the lower marginal cross vein more recurrent; the fly itself appears to be more slender; the head perhaps larger and the hind femora appear to lack the slender bristly spines characteristic of *Palaeosphegina.*

Palaeosphegina fumosa spec. nov.

Male. Length 5 mm.; wing 4.3 mm. *Head:* hemispherical, entirely black in color, eyes touching for about half the length from vertex to

antennae; the pile of front and upper part of face above tubercle black in color, rather abundant and dense; the occipital pile is also black. Tubercle of face small but well developed; eyes bare; the antennae dark brownish black, the third joint about one and one-third times as long as wide; the black dorsal arista thickened on the basal fifth; slopes of the face below the tubercle without pile. *Thorax:* and scutellum black with sparse delicate pile. The scutellum is rather long, apparently almost as long as wide, with a pair of rather close-set, long, black bristles arising from the apical margin. *Abdomen:* the color can not be positively ascertained; the first three segments are almost wholly dark brown and translucent, as is much of the right half of the fourth segment, but on the greater part of the fourth segment there is an extensive black pigmented area and there appear to be traces of such pigment on the more obscured portions of the basal segments, hence it is entirely probable that the abdomen was black in color; it is overlaid by the smoky right wing. The sternites of the fly are certainly brownish yellow in color. The hypopygium appears to have been large and well developed with lobes and processes, resembling Recent *Sphegina* in this respect; these structures can not be determined because of overlying, glistening air spaces. *Legs:* dark reddish brown, the hind femora slender, very little thicker than the other pairs; apical three-fifths black in color and the lateral, ventral margin equipped with ten widely spaced, rather long and slender black bristly spines which begin not far from the base of the femur. *Wings:* venation beautifully preserved; the entire wing smoky grey; stigmal cell yellowish brown; the subapical cross vein joining the third vein at right angles with a rounded bend just before it joins the third vein and its initial section straight. The first section of the fourth vein straight and quite long; a little longer than the lower marginal cross vein and equal in length to the last section of the third vein, running from wing tip back to subapical cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: one specimen, no. 9075 in the Museum of Comparative Zoölogy (Haren collection).

Sphegina abrasa Théobald

Les insectes fossiles des terrains oligocènes de France, 1937, p. 243; pl. 18, fig. 12.

Head: The base of the head preserves some traces of black; it is semi-circular and as large as the thorax. The eyes are bare, large,

projecting and of an oval shape. The face is flattened or depressed and the antennae are narrowly visible. *Thorax:* The body of this insect is of a reddish yellow coloration. The thorax is elongate, subrectangular, the corners rounded, the scutellum rounded posteriorly. *Abdomen:* clearly demarcated from the thorax, swollen and inflated into a club which is more extensive in length than the thorax; four segments are visible, the fourth of a darker color than the preceding ones. The body is covered with a fine pubescence. *Legs:* slender, finely pilose; the hind femora are swollen and carry two rows of spines. *Wings:* the venation is well preserved except towards the apex of the wing. The subcosta ends toward the middle of the anterior border; the R is elongate, the Radial sector is bifurcate, joining itself to 'M' through a transverse vein; 'M' bifurcate, "une cellule discoidale", the anterior branch of 'M' joins itself to 'Rs'; 'Cu' bifurcate, joining itself to 'M' (v. Figure). Dimensions: entire length- 8 mm.; wing- 5 mm.

Relationships: the venation of the wings is that of the Syrphidae. In the genus *Sphegina* the third femur is swollen and *arme* Brun. of India has the wings of the same color.

The author notes that Foerster has described *Syrphus reciprocus* in slabs of Brunnstatt. This species lacks the wing in his single individual specimen. It measures 6.5 mm.; perhaps it is identical with *Sphegina abrasa.*

Locality: Kleinkembs, France. Horizon: Oligocene.

Holotype: R 186. Coll. Mieg. Mus. Bâll. I have not seen the type; I give above restated and rearranged the important particulars from the author's description.

Sphegina obscura spec. nov.

Plate 4, fig. 1–3

Female (apparently). Length of the abdomen 7 mm. *Head:* and front half of thorax missing. This is an obscure specimen, but the shape of the abdomen and details of the femora can be made out fairly well. *Thorax:* scutellum large, with strongly and evenly convex margin, almost hemicircular, one and one-half times wider than the second segment at its smallest width. *Abdomen:* considerably constricted and petiolate. The last two segments flared and expanded, as is typical in the genus. The figure gives some idea of the relative shape and proportion of the segments. There are traces of spots in the third and fourth segments. It will be seen that the shape of the abdomen is not greatly different from *Sphegina infuscata* Loew. *Legs:* hind femora

thickened, but not spindle-shaped, the thickening begins quickly and ends more or less abruptly, although the taper, as in many species, on the distal end of the femora is gentle. There is a series of strong spines arranged on the distal ventral part of the hind femora. The distal third appears to have been dark in color. *Wings:* not easily discernible. The fore part of the wing is best preserved and the convexity of costa, and of second and third longitudinal veins is a matter of interest.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3947 in the Museum of Comparative Zoölogy. This is the specimen seen by Williston (1886).

Genus Eoxylota genus nov.

This form differs from *Hemixylota* Shannon in the slightly tuberculate face and in the presence of the very numerous short spines on the ventral part of the hind femora. The apical cross vein is less sigmoid in *Eoxylota* and the margin of the scutellum in *Hemixylota* is distinctly impressed. From true *Xylota, Eoxylota* is at once distinguished by the cross vein being basal and by the small tubercle.

Genotype: *Xylota pulchra* Meunier.

Meunier described it in the genus *Xylota.* Because of the slightly tuberculate face and the strongly basal cross vein, I am obliged to remove it from *Xylota* and I place it in the genus *Eoxylota.* In many respects it resembles the Chilean genus recently described by Shannon, *Hemixylota,* which is like the present form, with the basal cross vein throwing it out of Xylotinae and into Cheilosinae, in the modern sense. It is very odd that this genus should find its nearest living relative in Chile. I have recently seen a specimen of *Cyrtid* fly from the Bernstein fauna which also finds its nearest living relative in Chile and South Africa, bearing a mute witness to the flight of time necessary for such present isolated distribution. *Eoxylota* strictly speaking differs from *Hemixylota* only in the somewhat tuberculate face, slight differences in wing and facies. I have compared it with a specimen of the genotype of Shannon's genus kindly sent to me by Dr. Edwards.

Eoxylota pulchra (Meunier)

Plate 6, fig. 29–30; Plate 10, fig. 72–73

Jahrb. Preuss. Geol. Landesanst., **24**, (2): 207. Pl. 13, fig. 6 and 7 (1904)

Male. Length 11 mm.; length of wing 8 mm. *Head:* broadly oval, eyes very large, touching in the male but not for a great distance. The

front small, black, flattened, somewhat protuberant at the level of the antennae. Antennae located above the middle of the head in profile, first two joints short, third not very large, half again as long as wide, rounded apically, the arista short, thickened throughout, strongly on the basal half. Face deeply concave below the antennae, apparently with a small tubercle lying a short distance above the epistoma. The junction of the cheeks and face is quite angular and obtusely ridged, but scarcely more produced than the face at epistoma. *Thorax:* is broad, longer than wide, considerably flattened, with a few stiff bristles on the sides at base of wing. The mesonotum with thick delicate quite erect pile, in color uniformly black. Scutellum large, rather elongate, not quite twice as wide as long, the disc considerably flattened, erect pilose, the margin with about six pairs of long stiff tuberculous bristles; the apex seems to be rather thin, its color uniformly black. *Abdomen:* elongate, two and one-half times as long as wide, widest at the end of the third segment. Second, third and fourth segments subequal in length, the latter rather broad at the apex, but little narrowed and convex only on the sides. The hypopygium wide, broadly rounded and not greatly visible from above. The surface of the abdomen as a whole quite flattened, uniformly dark in color, appressed setaceous in the middle, erect pilose on the sides. *Legs:* the hind femora elongate, a little bit stout, not thickened, the whole ventral length with numerous short sharp spinous bristles, the femora black, narrowly reddish apically, the tibiae almost entirely light brownish red, a little bit darker, narrowly, in the middle. Tarsi light reddish brown, the hind tibiae much widened apically, pinched in before the apex, with many stout short terminal bristles or setae. *Wings:* elongate, longer than the abdomen, uniformly tinged with brown. Stigma darker. Vena spuria very faint; small cross vein a little oblique, long, entering the discal cell about three-eighths of the way from the base, the marginal cross vein long, almost paralleling the wing margin. Cross vein long, almost paralleling the wing margin, the outer one joining the third vein some distance but not remotely from tip. The basal marginal angles of the first and second posterior cells short, spurred; the last section of the fourth vein before the origin of the apical cross vein somewhat long, but only a third or less than the length of the apical cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: No. 8 in the University Museum at Konigsberg.

The above description as well as the illustration I give are taken from the type specimen. In describing this species, he makes much of the curious, irregular, jagged-edged spots on thorax and abdomen.

Unfortunately he mistook for a definite pattern what is only the fragmented condition of the surface pigment. This species is a uniformly blackish fly without pattern or marks.

The Subfamily CHRYSOTOXINAE

This small subfamily has at most but two living genera, but the genus *Chrysotoxum* itself, is a world wide aggregate of many species, all of them with a characteristic appearance. The fly described below is the only fossil insect that has yet appeared that seems to show any relationship to *Chrysotoxum*.

Genus PROTOCHRYSOTOXUM genus nov.

Large flies with prominent robust, very convex abdomens, much as in present day species of *Chrysotoxum*. Apparently there are narrow, basal, light colored fascia on the segments. The small cross vein is located well before the middle of the discal cell. The third longitudinal vein is straight whereas it is curved in *Chrysotoxum*. The head is wanting in the specimen and cannot be described. It is sufficiently well preserved, however, so that additional specimens, if they are ever found can be recognized.

Genotype: *Protochrysotoxum sphinx* spec. nov.

PROTOCHRYSOTOXUM SPHINX spec. nov.

Plate 2, fig. A

Male. Length 12.5 mm. *Head:* large, rounded, more or less subglobular, not quite as wide as thorax; no details of antennae visible. *Thorax:* dark, broad; scutellum obscure, apparently quite large with a circular rim. *Abdomen:* very large, evidently quite convex with emarginate rim. Four segments and the tip of a fifth visible. The abdomen is dark, short, stiff pilose and on the base of the fourth and fifth segment, particularly on the sides, there appears to be a pair of spots wedged-shaped, with a straight posterior edge, the acute portion of the wedge turned inward. *Legs:* absent. *Wings:* preserved in fragmentary fashion. The vena spuria is well developed, the whole of the discal cell is visible and the small cross vein enters this cell practically at the middle, its upper portion is strongly oblique. The lower marginal cross vein is upright on the basal portion and then is acutely drawn out

to join the fourth vein, the last portion of which is drawn down to meet it. The outer cross vein, while not erect on the basal half approaches this condition and gives off an inward spur and then is drawn out acutely but its confluence point and the tip of the wing are not visible.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 159, coll. Amer. Mus. Nat. Hist.

The Subfamily EUMERINAE

I place here Meunier's genus *Palaeopipiza*, which bears very little relation to *Ascia* (now *Neoascia*) and also my own genus *Doliomyia*. It seems to me the wings of these two flies suggest *Eumerus* in venation, as does the large, slightly quadrate third antennal joint, low set antennae, and much thickened arista, and straight and subconcave face types. Nothing is lacking but slight further changes in the wing and the development of megamorphic femora.

Genus Palaeopipiza Meunier

Ann. Soc. Sci. Bruxelles, **26**: 103, fig. 6. (1902); Jahrb. Preuss. Geol. Landesanst., **24**: 209 (1904)

Head: eyes extensive. Condition in the male unknown. The back of the head in profile very rounded and convex. Antennae set about the middle of the head in profile, possibly a little below. The antennae short, the first and second joints particularly so, the third joint very large, flat, a little longer than broad, slightly more developed on the ventral surface leaving the joint somewhat asymmetrical but not exactly quadrate. Arista set in the middle of the upper surface midway between the base and end, very short, two basal segments visible and grossly thickened throughout although the tip is slender; surface pubescent. Face below antennae distinctly concave, flat to the level of the eyes, the epistoma a very little produced and rounded. Front apparently bare. Face with some sparse pile. Occiput well developed behind the ocelli and for a short distance along the eyes then scarcely visible. *Thorax:* quite short, as broad as wide, at least convex; short pilose without macrochaetae. Scutellum quite large, perfectly semicircular. Margin convex, with a few slender bristles, only the apical two of any length. *Abdomen:* not quite twice as long as wide, broad basally. Scarcely less broad at the beginning of the fourth segment at

which becoming very convex, it tapers to the narrowly rounded tip of the fifth segment. Abdomen everywhere short pilose, except at basal corners. Posterior pile appressed. *Legs:* hind femora short and slender. I cannot discern if spines are present. Hind tibiae as long as femora, considerably thickened on the outer three-fourths. *Wings:* venation as *Palacoascia*. The apical cross vein much longer, parallelling wing margin, joining third vein not far from tip. Vena spuria appears to be faintly present; this is uncertain.

Genotype: *Palaeopipiza xenos* Meunier.

Palaeopipiza xenos Meunier

Plate 8, fig. 55–57; plate 13 fig. 117

Ann. Soc. Sci. Bruxelles, **26**: 103; fig. 6. (1902). Jahrb. Preuss. Geol. Landesanst., **24**: (2) 209 (1904)

Female. Length 6 mm.; length of wings 4.7 mm. *Head:* the eyes apparently dark in color. Antennae dark brown, the third joint orange brown in parts. Arista brown, the pile of the face white in color. The front at the region of the antennae is very little prominent. Concavity of the face not very deep. There are a few long pale bristles about the ocelli and some still longer dark bristles on the vertex behind the ocelli. *Thorax:* and scutellum dark in color, apparently aeneus, the pile everywhere pale and the bristles of the scutellum pale. *Abdomen:* concolorous with the thorax throughout. The sides of the segments very narrowly yellow, the pile of the abdomen without exception everywhere pale. *Legs:* femora black, possibly aeneus; the bases of the tibiae to a varying extent, on the hind tibiae almost the whole, dark brown, remainder brownish yellow. *Wings:* somewhat brownish, the stigma a little darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: in the University Museum at Konigsberg. No. K4304, 2492 (K4304-Klebs).

Genus Doliomyia genus nov.

Small short robust species. *Head:* large, barely wider than thorax, not very elongate nor yet is it flattened, the males probably holoptic, the front long, very convex in profile. The antennae distinctly set above the middle of the head in profile, quite short but the third joint very large, suborbicular. The arista somewhat longer than antennae basally, thickened but not conspicuously, bare and slender pointed.

Face below antennae perfectly straight, gently retreating. Cheeks practically nonexistent, so that at the epistoma the face is only half as long as the third antennal joint. Occiput tumid for a short distance above and close to the vertex. *Thorax:* about as long as wide, the scutellum short and quite wide, a little over twice as wide as long, the disc convex and the rim narrowly emarginate and impressed, without strong bristles. Dorsum of thorax and scutellum exceedingly short microsetate. *Abdomen:* short and broad, barely wider basally than the thorax, convex and very short microsetaceous. *Legs:* femora short, slender, not thickened and with short setaceous bristles instead of spines ventrally. *Wings:* a little longer than abdomen, broad basally and broadly rounded at apex. The third longitudinal vein ending with costa a little beyond the tip of the wing. The lower marginal cross vein straight, directed considerably away from the margin of the wing and thus oblique rather than parallel. The last section of the fourth vein before the origin of the apical cross vein quite long, the apical cross vein angulate a little before the middle, the angle directed inward but without spur. The confluence of the apical cross vein with the third vein is not very far from the tip, but the remaining distance of the third vein to the tip of the wing is about one-fourth of the length of the apical cross vein. Both the basal angles of the first and second posterior cells spurred. Wings villose throughout. Vena spuria very faint if not actually absent.

Genotype: *Doliomyia chalybea* spec. nov.

This genus differs from Meunier's *Palaeopipiza* in the fact that the antennae are definitely located above the middle of the head in profile. The arista of *Palaeopipiza* in contrast to *Doliomyia* is very short, strongly thickened basally, pubescent and not very slender on the apical half. The third joint of *Palaeopipiza* is somewhat truncate on the dorsal area and the face somewhat concave in profile. The abdomen of *Palaeoascia* is elongate, very convex, strongly drooping from the base and is suggestive of *Paragus* (Recent genus). The subapical cross vein is not strongly angulated; both of these genera remind one very closely of the genus *Eumerus* among Recent Syrphids. The wings of *Doliomyia*, the large third antennal joint, the shape of the face all suggest *Eumerus*. They are sharply distinct from *Eumerus* through the absence of a grossly thickened, swollen hind femur, with its denticulate, ventral apex and from *Citibaena*, a close relative of *Eumerus* with slender femora, again with the absence of spines on the femora and the quite bare eyes. In *Citibaena* the eyes are densely long pilose.

Doliomyia chalybea spec. nov.

Plate 8, fig. 58–59; Plate 9, fig. 62; plate 13, fig. 116

Female. Length 6 mm.; length of wing 5 mm.

Head: broad. Face, front and vertex black in color, the antennae very dark brown to black. Arista black. Pile of front very short, becoming still shorter before the antennae, but if bare at any point it would be very narrowly before the antennae. Pile of vertex about the ocelli a little bit longer, the occiput on the sides very short pilose and short pilose below. I cannot distinguish any pile on the face. The face is well preserved and so it is quite possible the pile was absent or if present was only in the form of micropubescence. *Thorax:* and scutellum jet black, the pile exceptionally short without macrochaetae anywhere. There is a narrow, convex, impressed margin on the extreme end of the dorsum of the thorax just before the scutellum. One specimen suggests that the thorax was dark shining bluish. *Abdomen:* dark blackish in color and all of the legs dark black. *Legs:* the tibiae a little bit lighter perhaps and the apical joints of the tarsi light brown. *Wings:* strongly infuscated and smoky throughout, the stigma darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: specimen No. B16788 (Slide no. 16788) in the University Museum at Konigsberg.

Paratype: a specimen labelled B438 (slide numbered 438). Both are from the collection of Dr. Klebs.

The Subfamily MICRODONTINAE

Serres assigned a species to this subfamily in 1829, which he neither described nor illustrated; since he did not give a type number, I have been unable to trace the specimen. I am inclined to believe he was right in his placement, for *Microdon* is so characteristic, that it is difficult to see how he could have been mistaken. Perhaps no single fossil would be as interesting as this one, for the subfamily Microdontinae is very peculiar, consisting of hundreds of species of very unstable nature.

Genus Microdon species Serres

Geognosie des Terrains Tertiaires, p. 253, (1829).

Serres stated that this fly closely approached the species *Aphritis auropubescens* described by Latreille.

Locality: Aix, Provence, France. Horizon: Oligocene.

Type: I was not able to locate the place of deposition.

The Subfamily ERISTALINAE

Four genera are assigned here. At least two, possibly three or even all of the genera are very questionable.

a. *Helophilus primarius* Germar. This record should be deleted, in my opinion, from the family. I can not see that there is the slightest reason for placing this fly in *Helophilus*. I did not locate the type.

b. *Merodon germari* Heyden. I located this type in the British Museum. It is extremely interesting and the body and legs beyond doubt suggest *Eristalis*, but even when discovered the wing was insufficiently preserved to say that it should definitely go into the Eristalinae. To definitely place a fly in the subfamily Eristalinae, we must rely on the third vein being kinked, because if it were not (and it fortunately is in over seven hundred species which are in about sixty genera and subgenera) we should have to fall back, in present knowledge, on the basal femoral patches of setae, a character that varies to some extent. Besides the kinked vein, it is true that the Eristalinae almost always possess very robust abdomens and often large squamae, but we can hardly define the subfamily in these terms. The ancestry of Eristalinae is too poorly known for us to conjecture much upon its origin. Their face is nearly always tuberculate, only three of many genera excepted, and the origin of both of these, as well as the Sericomyinae is obscure. I believe that through *Mallota*, *Brachypalpus* and *Criorrhina* and even better through *Sericomyia*, we find a certain amount of closeness which is more than resemblance. This points vaguely to a relationship with Xylotinae but at an extremely early period, because most true Xylotinae have the opposite type of face. It is significant that plumose aristae are restricted (one exception in Cheilosiinae) to Eristalinae (a few genera), Volucellinae (all genera) and in Sericomyinae (all genera). We have seen that the Volucella-form existed complete, except for the wing, in the lower Oligocene.

c. Scudder described *Eristalis lapideus* from Green River, Wyoming, but Williston, who saw the specimen, did not believe it was an *Eristalis*. Since the type is now lost, we will have to wait until it is again found to know its real affinities. Williston was almost certainly right in assigning it elsewhere.

d. *Palaeoeristalis tessellatus*, new genus and species (described below). I place this species in an Eristalinae genus on the basis of the short rotund abdomen and the slight curvature of the third vein. Since it is poorly preserved, this is all that I can discover of significance. There are other genera (non-Eristalinae) with the third vein shallowly

dipped. This is quite possibly an early type of *Eristalis* in which the third vein has not yet become deeply and definitely kinked.

Helophilus villeneuvi Thèobald

Les insectes fossiles des terraines oligocines de France, 1937, p. 351; pl. 7, fig. 12.

Length 12 mm. *Head:* large, as wide as the thorax, semicircular in shape. The eyes do not quite touch. The vertical triangle is large, the front short, the posterior border of the head almost straight. The ocelli and antennae not visible. *Thorax:* black, oval and strongly pubescent. *Abdomen:* wider and longer than the thorax, compressed and ovoid; black in color with clear spots on the borders and clear transverse bands. *Legs:* wanting. *Wings:* long and over-reaching the extremity of the abdomen. The venation is obscure but the costa, subcosta and radial sector veins can be distinguished. The radial sector is bifurcated. The longitudinal fold of the vena spuria can be discerned.

The author places this insect in *Helophilus* largely upon the basis of size, compact shape and an abdominal pattern somewhat similar to that of *Helophilus quadrivittatus* Wied. He states further that the first, second, third and fourth segments of *villeneuvei* carry the clear lateral spots; the fifth carries besides a transverse clear band.

The olose approximation of the eyes suggests the genus *Mesembrius* instead of *Helophilus;* the marked pubescence of the thorax might indicate *Mallota* or some subgenus of this group. There are considerable number of closely related subgenera in the Helophilini.

Locality: Aix-en-Provence, France. Horizon: Oligocene.

Type: L'Ecole des Mines de Paris.

Helophilus miocaenicus (Stackelberg)

Tubifera miocaenica Stackelberg, Revue Russe d'Ent., **19**, p. 89–90, Taf. II (1925).

This species was described by Stackelberg from the Middle Miocene of Voroshilovsk, Caucasia. His description is accompanied by an excellent photograph which shows clearly much of the venation of the wing and shows the pattern of the abdomen well. This pattern with its large, paired, pale spots, almost touching, and black posterior borders is not greatly dissimilar to that of *pendulus* Linnaeus, a Recent species. The character of the venation clearly places the fly in the

subfamily Eristalinae. The loop of the third vein is deep and evident. The marginal cell appears to be open as is required in the genus *Helophilus*. The description is not quoted here in as much as it will be necessary for the student to refer to the original illustration.

Merodon germari Heyden

Plate 5, fig. 26; Plate 8, fig. 60

Palaeontographica, **78**: 10; fig. 5 (1862)

Size quite large. *Head:* very large and not so wide as humeri, somewhat shallow, but it is not long. Eyes touching, mid-line facets not enlarged, occipital eye margin seen from above laterally sharp and with two little borders as far as can be ascertained. *Thorax:* broad, robust, black in color. Scutellum cannot be made out clearly, but appears to have been about one and three-fourths times as broad as long. Thorax short, pilose. *Abdomen:* broad, slightly emarginate, with two distinct black patterns with markings sharp and not cloudy on edges. Posterior margin overrun with post bristles, long and sharp. Pattern as follows: a black posterior border on second segment, widening toward sides and produced as a median stripe, until it reaches the margin of the first segment, where it spreads out narrowly. Second segment with much wider posterior margin, only very narrowly wider laterally, with similar median stripe reaching second segment and not spreading out as it does so. Third and fourth segment with a similar band. Fifth appears to have been entirely dark. Hypopygium small. *Legs:* hind femora very thick, but not greatly thickened out of proportion to the size. There is some evidence of a few setigerous bristles apicoventrally on the hind femora. Hind femora thickly covered with short sharp, slender bristles. Hind tibiae similarly covered. *Wings:* poorly preserved. Base with a few short sharp spinules. Size and patern resembling that of a species of *Milesia*.

Locality: Rott, Germany. Horizon: Upper Oligocene.

Holotype: British Museum of Natural History; the type was studied.

Genus Palaeoeristalis genus nov.

Head: hemispherical. *Thorax:* short and broad. Scutellum one and three fourths broader than long. *Abdomen:* quite robust and short. Five segments can be seen. The abdomen is broadly rounded past the second segment and evidently quite convex. *Legs:* hind femora very much thickened, the thickening spread more or less over the whole

length but a little greater basally. Ventro-distally the femora is equipped with many small setae rather than spines. *Wings:* with the third longitudinal vein gently curved down into the first posterior cell. The apical cross vein joins the third vein not far from the tip of the wing; it is sinuous. The lower cross vein is near to the margin of the wing and more or less parallels it. Third vein ending near tip of wing.

Genotype: *Palaeoeristalis tesselatus* spec. nov.

Palaeoeristalis tesselatus spec. nov.

Plate 4, Fig. 7–9

Head: hemispherical with detail apparent. *Thorax:* short and broad. No pile can be seen, nor any bristles. Scutellum about one and three-fourths times as broad as long, rather square in outlines, with simple margin. *Abdomen:* five visible segments; form broad and rounded. Second segment two and one-half times as broad as long, third twice as broad as long, and the remaining two, short, evenly rounded off. Abdomen indistinctly marked but the second and third segments have each a wide posterior border dark in color, which is slightly and gradually widened as it approaches the lateral margin, and which medially interrupts the anterior pale band in a rather broad fashion. The margin of the spots are vague and not sharply delineated. The color is darkest along the median line. The fourth and fifth segments more or less wholly dark. Posterior halves of second and third segments, especially the dark areas, and the terminal segments covered with short, quite thickly set, bristle-like hair, which in the middle is directed posteriorwards and on either side obliquely towards the lateral margins. *Legs:* one hind femora shows as a pale enormously thickened structure with many sharp black setae on the ventral distal two-thirds. The hind tibiae are long. *Wings:* poorly preserved. Marginal cell open. Anterior cross vein joining discal cell way beyond middle, somewhat drawn out in oblique fashion but not markedly so. Subapical cross vein apparently angulated. Costa microsetose. Third longitudinal vein with a decided flexure without in the least being kinked.

Locality: Dragon, Utah. Horizon: Eocene.

Holotype: no. 3948 in the Museum of Comparative Zoölogy, (F. M. Carpenter, collector).

This is a remarkably interesting form. With its small size, broad round abdomen, thickened femora, it suggests chiefly an *Eristalis*. Present day *Eristalis* must have a kinked third longitudinal vein.

Eristalis paucisinuatus Thèobald

Les insectes familes des terraines oligocènes de France, 1937, p. 352; pl. 23; fig. 12.

Length 11.5 mm. *Head:* large and transverse; the facettes of the two large eyes are visible, they appear to touch on the front. The anteriorly produced antennae have a pointed arista which is not plumose. *Thorax:* large, black, finely hairy with numerous bristle. Scutellum large and rounded. *Abdomen:* oval, rounded at the extremity with four segments visible. The pattern of the abdomen suggests slightly that of *Eristalis solitus* Walker; the pattern of the second and third segments especially differing. *Legs:* at least the hind femora swollen and enlarged and hairy. *Wings:* the wings lie folded upon the abdomen; almost all the venation is visible. The vena spuria is clearly visible. There is a curve in the third longitudinal vein which is not so deep as that in *E. solitus* Walker.

This fly would appear to be a satisfactory example of the Eristalinae. The more gently curved third longitudinal vein is a matter of special interest as in all Recent members of this subfamily this vein is rather deeply kinked.

Locality: Aix en Provènce, France. Horizon: Oligocene.

Type: No. 1005, Thèobald collection.

The Subfamily VOLUCELLINAE

The Volucellinae is one of the dominant Recent types of Syrphidae; its species are preeminently characteristic of the Neotropical Region. Very few fossil flies have been associated with this subfamily. Loew mentioned an undetermined specimen from the Baltic amber which he assigned to *Volucella*. The only other instance is the unique new genus *Ptilocephala* from the amber. It is clearly *Volucella*-like in eight particulars.

Genus Ptilocephala genus nov.

Head: small. Eyes large and flattened, the front especially steep, oblique, flattened and concave, but a little bit convex before the antennae. Antennae situated three-fourths of the way up from the bottom of the head and at the junction of the middle and upper thirds of the eyes. First two joints short, third joint elongate, three or four times longer than wide. The arista a little longer than antennae, plumose with twenty rays above and with many shorter ones below.

The head below the antennae very flat, not produced near the bottom of the eyes, the face is abruptly and conspicuously produced into a rounded and protuberant knob or tubercle which is beset with long bristles. Below the tubercle the face recedes gently and then drops vertically for a considerably greater distance. *Thorax:* with stiff macrochaetae along the margin and on the margin of the scutellum. Scutellum with an oval concave depression on the disc. *Abdomen:* short, appressed setose. *Legs:* hind femora short, somewhat thickened in the middle, and spread out over the whole length. Tibiae very short and thickened on the distal two-thirds and about three-fourths as long as femora. Details of the ventral surface of femora cannot be ascertained. *Wings:* large, but short and broad, a little longer than the abdomen, broadest basally, and but little less broad toward the apex. The vena spuria faint, but present. Alulae well developed. Stigma pale. Costal cell very wide, the costa with a double row of unusually heavy, long, erect, sharp-pointed microspinulae; the lower marginal cross vein straight, directed away from wing margin. Spurs of fourth and fifth longitudinal vein very short or absent, the apical cross vein sinuous, joining the third vein at right angles but not recurrent some distances from tip of wing but not remotely.

Genotype: *Ptilocephala volucelloides* spec. nov.

This genus is unique in many ways, and is the only certain fossil member of the subfamily *Volucellinae*. Loew mentioned having seen a species of the *Volucella* from the amber, but he did not describe it or assign any number to it. I have studied all the Syrphids mentioned by him except the *Volucella*, which I did not find at the British Museum with his other specimens. The present species forms a true connecting link between the Cheilosinae and Volucellinae because it has the venation not greatly different from *Cheilosia* and the tuberculate face, and the chaetae of *Cheilosia* and has the plumose arista of *Endoiasiamyia* (*Hiatomyia*). Indeed, when I first thoroughly examined the specimen I considered it to belong to this genus. However, the knobbed, bristly, tuberculous, deep conical face, the macrochaetae are all characters which are strongly *Volucella*-like and the facies of the insect is more like that of *Volucella* than it is of *Cheilosia*. Lastly, were the apical cross vein recurrent and did the third vein join costa far above tip of wing one would have practically transformed it into a modern *Volucella*-like type. The depression on the scutellum reminds one of *Phalacromyia* but it is much more like that of *Graptomyza* and the faint vena spuria and the concave flattened front also suggests this genus. It is a peculiar and interesting fly, which is clearly Volu-

cella-like in eight particulars; the wing however is but little suggestive of *Volucella*. Has body-type here, as in *Xylotosyrphus* been laid down before wing shift? Or is this but an aberrant off-shoot? I do not see how the former conclusion is to be avoided. *Ptilocephala* combines some of the characters of the most specialized and of the most simple genera of the Volucellinae.

Ptilocephala volucelloides spec. nov.

Plate 6, fig. 31–35

Female. Length 4.8 mm.; length of wings 4.6 mm. *Head:* broader than thorax. Eyes large, flattened, widely separated in the female, the top of the head obliquely flattened as in certain species of *Volucella* or *Graptomyza*. The front between the ocelli and the slightly convex portion just above the antennae is shallow, concave, and flat and erect sparse pilose. Antennae situated about three-fourths of the way up from the bottom of the head or nearly at the junction of the upper and middle third of the eyes. Antennae elongate, the first two joints short, the third joint three and one-half to four times as long as wide, dark brownish black in color. The arista barely longer than antennae, strongly thickened basally and long stiffly plumose above and below, the upper basal rays the longest. About twenty rays on each side. Face below the antennae in profile apparently flat with the level of the eyes, then a short distance from the level of the bottom of the eyes strongly and abruptly produced out as a rounded blackish bristle-beset knob, which is very protuberant, rounded, and below which the face continues to drop, after a brief recession, for some distance. Cheeks not very conspicuous, the actual epistomal-cheek-occipital profile is obscured by exuvia. Presumably the face is sharply conical and the oral profile concave. *Thorax:* convex, with two stiff bristles on the side before the wing, two above the wing, two on the mesopleura, three on the posterior calli, one bristle on each side before the scutellum and a little bit to the outside. Scutellar margin with three pairs of bristles, all of which are exceedingly stout and thick. Pronotum of thorax with a collar of short stiff bristles. Scutellum with the disc broadly and symmetrically flattened and concave, the margin of the concavity lined with bristles and a very few bristles on the concavity. The scutellum suggests that of *Graptomyza flavorhyncha* Hull in the matter of this oval concavity. *Abdomen:* short, broad, a little longer than wide, black in color; as far as can be discerned, with thick short appressed bristles. Much of the abdomen is hidden and obscured by

the wings. *Legs:* hind femora a little bit thickened in the middle, short, the color obscure but mostly dark. *Wings:* light brownish, stigma a little darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum of Konigsberg (No. X 118).

Volucella species Loew

Ueber den Bernstein und die Bernsteinfauna Meseritz Progr. k. real schule p. 1–48. (1850)

The dipterist Loew mentioned having seen a specimen of this genus preserved in amber but he gave no name to it. The specimen should be in the British Museum, but I was not able to locate it among the other material examined there.

The Subfamily XYLOTINAE

Two genera have been assigned here by name without numerical or species designation. They are *Criorrhina* Giebel and *Tropidia* Handlirsch. I was privileged to search through the collection of the late Dr. Handlirsch in Vienna, but without finding the *Tropidia.* I have been unable to trace Giebel's collection. *Tropidia,* to occur in the modern sense, must have a megamorphic femora, a femoral plate and carinate face.

Xylotosyrphus is to be doubtfully placed here. It has all that Xylotinae should have except a definitely post basal small cross vein. It is an early type, connecting through the *Myioleptini,* the *Cheilosinae* and Xylotinae.

Megaxylota is a large and beautiful fly from the amber. It is a true Xylotinae in every respect, and is not unlike, in some ways, *Brachypalpus* or *Calliprobola.*

Genus Criorrhina species Giebel

Zietschr. Geol. Nat., **2**: 87 (1870)

There is considerable uncertainty whether this genus occurs in the Baltic amber. Whether Giebel was dealing with such a species or not is uncertain, because in his brief remarks he compares the fly to a *Dolichopodid,* and of course no *Criorrhina* could be anything like this. It will be necessary to wait until the type is located to determine the matter.

Genus XYLOTOSYRPHUS genus nov.

Head: more or less destroyed, about as wide as thorax. *Thorax.* long and broad, somewhat convex, dark in color, without pattern. The scutellum one and one-half times as wide as long, with simple semi-circular rim. *Abdomen:* two to two and a half times as long as wide with prominent rounded hypopygium and the sides of the abdomen nearly parallel. Abdomen marked with two pairs of prominent, subquadrate, pale spots on second and third segments. *Legs:* hind femora considerably thickened. *Wings:* with venation more or less like that of *Xylota* but the small cross vein definitely basal in position and entering the discal cell less than half of the way from the base.

Genotype: *Xylotosyrphus pulchrafenestra* spec. nov.

This genus seems to be in every respect like certain species of present day *Xylota*, except that the small cross vein is definitely well before the middle of the discal cell and in our modern scheme of things this would preclude placing it in the Xylotinae. Consequently many things such as general body form and pattern have a more ancient history than the relative position of the small cross vein, long relied upon as an important index of relationship. It may be that more fully preserved specimens will later show other differences between *Xylotosyrphus* and present day *Xylotas.*

XYLOTOSYRPHUS PULCHRAFENESTRA spec. nov.

Plate 4, fig. 12

Male. Length 10 mm. Width of abdomen 2.7 mm. Length of wing indeterminate (about 6.8 mm.).

Head: the head shows little detail. Part of the head past the occiput being destroyed. *Thorax:* stout, broad, and relatively short in profile with a gently forward downward slope from the middle. Scutellum rather small, evenly rounded. *Abdomen:* the sides of the abdomen are parallel, with a beautifully rounded (hemicircular) tip, suggestive of the hypopygium of the male. Five segments visible. Abdomen marked with four pale quadrate windows, a pair each on the second and third segments, each of these segments is divided by a median black stripe and the anterior median corners of the second pair of spots and the post median corners of the first pair of spots are markedly rounded and convex, leaving the black concave. Remaining segments and hypopygium dark in color. Abdomen largely covered with extremely short, thick, decumbent, black, bristly pile. *Legs:* hind femora

considerably thickened, greatest in the middle or just past the middle; in length about three times as long as greatest width. Remaining femora slightly thickened. Hind femora with numerous stiff black spinules ventrodistally. The hind tibiae appears to have been spinulose basi-ventrally. No further details of the legs can be seen. *Wings:* very little shows. In one specimen it can be ascertained that the anterior cross vein is beyond the middle of the discal cell and is pulled down distally to an oblique angle. Morover, the terminal section of the fourth longitudinal vein as it joins the postical cross vein, is strongly curved downward or deflected. It joins at an angle of some sixty or seventy degrees. Marginal cell open.

Two beautiful specimens which show, as far as can be ascertained, all the characteristics of our modern *Xylota*. It is impossible to ascertain whether they would come in the neotropical *Planes*, which is a *Xylota* with carinate face.

Locality: Dragon, Utah. Horizon: Eocene

Holotype: No. 3942 in the Museum of Comparative Zoölogy (F. M. Carpenter, Collector.)

Paratype: one specimen, with the obverse and reverse, Nos. 3943 and 3944, in the Museum of Comparative Zoölogy.

Genus Megaxylota genus nov.

Head: large and broader than thorax, rather wide and not particularly elongate. The females are broadly dichoptic. The front convex, somewhat protuberant, the antennae situated a little below the middle of the head in profile; short; third joint large, a little longer than broad; rounded. The arista quite long and slender. Face below antennae deeply concave; the epistoma thrust forward at face itself, short, it is but little more produced at junction of face and cheek and not angularly ridged. Occiput scarcely visible in profile from above, the back of the head is gently convex and the flanges on the lower part of the occiput behind head are conspicuous. *Thorax:* half again longer than wide, quite convex, short, dense, erect pilose. Scutellum not large, convex on the rim, flattened on the disc, the apex subtruncate, the margin with a few long slender bristles. *Abdomen:* a little over twice as long as wide and a little bit convex, especially terminally, broadest in the middle, not greatly tapering towards the end. *Legs:* hind femora very massive, especially on the basal three-fourths, rather narrowed apically, the ventral part of the hind femora with a slight bulge shortly before the end and beset with many rather short stiff

bristles, but no spines. Hind tibiae very short, only three-fifths as long as femora, thickened throughout, very arcuate, ending transversely. *Wings:* elongate, pointed apically, broadest basally. The small cross vein is very oblique; it joins the discal cell about three-fifths of the way from base. Wings *Xylota*-like in venation. Marginal angles of the marginal cells spurred, apical cross vein sigmoid, joining the third vein not very far from the end of the wing. Vena spuria prominent. Alulae present.

Genotype: *Megaxylota magnifemur* spec. nov.

These are large flies. This genus differs principally from *Xylota* in the grossly thickened femora, which unlike *Xylota* lacks completely all spines on the femora. The very short, quite arcuate transverse-ending tibia is characteristic.

Megaxylota magnifemur spec. nov.

Plate 7, fig. 40–42; Plate 8, fig. 52–53

Female. Length 16 mm.; length of wing, 10 mm. *Head:* broad, eyes apparently bare, the ocelli but little protuberant. The pile of the front very short but dense and apparently restricted to the upper half, indicating that the front of the male is pubescent only. Face and front as nearly as can be ascertained under the whitish exuvia, dark in color. Face pubescent only, the facial strips fairly wide and conspicuous and with a fringe of hairs. Cheeks near the occiput with some long hairs and the pile of the occiput throughout is thick, though not very long. No spines near the top. Occiput broadly rounded near the margin. Humeri and pleura densely pilose. *Thorax:* the pile of thorax and scutellum seems to be pale in color throughout. Scutellum black, the posterior calli brownish orange and due to the exuvia it is impossible to tell the color of the mesonotum or of the abdomen. *Legs:* the femora seem to have been orange brown, somewhat lighter apically, and the tibiae and tarsi were beyond question light in color. *Wings:* are somewhat matted to the abdomen and also coated and while the venation shows well, the abdomen is somewhat obscured. Wings were pale yellowish brown in color.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. This specimen bears no number; the slide is numbered 'D'. I affix the number H 105.

Genus Tropidia species

Handlirsch, Handbuch Palaeont. und Zool. **4** (2): 1024 (1908)

The genus *Tropidia* is a fairly well marked and characteristic genus, but I cannot say definitely whether or not Handlirsch was sufficiently familiar with the genus to recognize it. Consequently it must await further study. I was unable to locate the specimen in Handlirsch's collection in Vienna. He gave no specific name to the specimen.

INCERTAE SEDIS

Syrphus curvipetiolatus Meunier

Jahrb. Preuss. Landesanst. **24**: 210, pl. 13, fig. 8, 9 (1904)

Male. Length of body: 7.5 mm.; length of wings 4.5 ? mm. *Head:* oral margin is conspicuous. Facial tubercle not distinguishable. Antennae small. Eyes touching on the front. The first two segments on the antennae short, the third rounded off, the antennal arista moderately short and thick. *Thorax:* scutellum black, faint, hairy. *Abdomen:* transparent. It is impossible to discern whether it has bands or stripes as in Recent forms. *Legs:* claws large, bent. Pulvilla strongly developed. *Wings:* this form is characterized by a very short appendicular vein proceeding to the posterior cell, which is always clearly evident in Recent species of *Syrphus.* (Translated and rearranged from the original).

Locality: Baltic, Germany. Horizon: Oligocene.

Type: No. 4445 from the Kgl. Bernstein collection at Konigsberg. (not seen).

This is the only species described by Meunier of which I was not able to find the type or a specimen. This fly apparently does not belong to the genus *Syrphus.* The type must be examined before it can be definitely determined to what genus it belongs.

Syrphus bremii Heer

Die Urwelt der Schweiz, fig. 314 (1865)

The note below is the only comment that Heer makes about this species and *Syrphus shellenbergi,* which he figures.

"The hoverflies (Syrphiden), however, are in two forms, which are marked as in the living species with their pretty banded abdomens (Fig. 314 and 315)."

This species may be recognized by the narrow black bands on the

base of the third and fourth segments, each broadly interrupted in the middle, and the large flat triangle in the middle of the second segment. This maculation makes it unique and easily recognizable, but as it is characteristic for certain Stratiomyids and as the wings in this fossil fly seem to have been very imperfectly preserved, there is a considerable possibility that *Syrphus bremii* is a *Stratiomyid.*

Locality: Oeningen, Germany. Horizon: Miocene.

Type: Not located.

Syrphus schellenbergi Heer

Die Urwelt der Schweiz, fig. 315 (1865)

See the comments under *Syrphus bremii.* Characterized by the fact that all of the second, third, fourth and fifth segments are solid black on all the central portions; narrowly margined everywhere with pale color.

Locality: Oeningen, Germany. Horizon: Miocene.

Type: Not located.

Helophilus? primarius Germar

Insekt. Protog ae. Spec., Fasc. 19: 25, pl. 25 (1837). Giebel. Fauna der Vorwelt. Die Insecten und spinnen der Vorwelt, **2**: 201 (1856)

This species is unrecognizable from the description and figures.

Locality: Bonn, Germany. Horizon: Oligocene.

Type: Not located.

Eristalis lapideus Scudder

Bull. U. S. Geol. Geogr. Surv. Terr., **3** (4): 756 (1877). Tert. Ins. sp. 558 pl. 5. fig. 48. (1890). Williston, Synopsis N. A. Syrph., p. 281–283 (1886)

The following comments based upon Scudder's description are pertinent.

Length of thorax 3.5 mm.; breadth of thorax 3.5 mm. The specimen was poorly preserved but fixed in dorsal aspect with the wings partly expanded. The head was almost wanting and the thorax without markings. The abdomen was long, broadest in the middle of the basal half and posteriorly tapering considerably; the tip of abdomen was rounded. The apical half of the first segment was black and formed a distinct transverse fascia. There appeared to be five segments. The venation of the wings shows only upon the basal half of the wing and

there poorly; the alula was distinct and quite large with oblique, dark, transverse ridges indicative Scudder says of *Volucella* or *Oestrus*.

Locality: Chagrin Valley, White River, Colorado (W. Denton). Horizon: Eocene.

Type: one specimen. I was not able to locate the type.

It is rather doubtful if this fly belonged to *Eristalis* but a better specimen is required for a decision as to its affinities. Williston, who also doubted its affinity with *Eristalis*, stated, "Of the thirty or more species which Mr. Scudder had separated out, I was first struck with the fact that probably all belong to the first division of the family with a basal cross-vein, a conclusion at which Mr. Scudder had already, independently, arrived. There are two possible exceptions to this rule, but both of them are doubtful, in view of the general relationships of the other material studied. The first possible exception is the specimen which Mr. Scudder had doubtfully referred to *Eristalis*."

Insects Misidentified as SYRPHIDAE

Several names have in the past been associated with the family Syrphidae, but do not belong there. These are briefly mentioned below.

Cheilosia dubia Weyenbergh

Archives du Musée Teyler, **2**: 259 (1869)

Cheilosia dubia Weyenbergh should be deleted from the list of fossil Syrphidae. I quote from a recent letter of Dr. E. Dubois of the Teyler Museum, who had a photograph made of it recently:

"The imprint is very ill-defined. In my opinion and that of one of my palaeontological pupils, specialized as an entomologist, it only shows to be of an insect. We can understand that Handlirsch says of it, 'Ist sicher kein *Cheilosia* und keine Syrphide und vermütlich überhangs kein Dipteren'."

Psilota tabidosa Scudder

Tert. Ins., **13**: 561 pl. 9, fig. 9 (1890)

Length 5.0 mm.; wing 3.9 mm.; abdomen 3.8 mm.

The type of this species has been examined (Mus. Comp. Zoöl.). It consists of a body, one wing and a very imperfectly preserved head and thorax that must necessarily be completely disregarded. The venation is obscure. Nevertheless, certain portions show tolerably

clearly. Everything considered, the size, shape of body and wing, and the apparently six or seven segmented body and venation remove this fly from any possible location in the Syrphidae. It has in a strong degree the habitus of a Scenopinid or window fly. It must be noted that, while the apparent segmental lines of the abdomen may not all be true segmental divisions, still there are no Syrphids known with such additional creases midway between segments. If the specimen is viewed as a Syrphid the rounded nodose termination of the abdomen would be equivalent to a hypopygium; thus the specimen would be a male and limited to five segments. I believe, the species must be removed from the Syrphidae, perhaps placed in the Scenopinidae.

Remalia sphinx Brodie

Hist. fossil insects second. rocks England. 1845

This species was wrongly included in the Syrphidae. A glance at the original pagination and subtitles will show that it was originally described by Giebel (1856) under the family Muscidae, Brodie (1845) having listed it only.

Syrphopsis globosiceps Zeuner

Fortschr. Geol. Paleont. **11** (28): 316 (1931)

This species is based on a very insufficient specimen. I can make nothing of it from my examination of the type specimen, and see no basis for including it among the Syrphidae.

CONCLUSIONS

This study of fossil Syrphid flies warrants consideration along three different lines:

1. A general consideration of the relationship of fossil genera, species, and individuals to the Recent fauna and the origin of the family.
2. Special evidence afforded as to morphological changes.
3. Evidence afforded as to variation of species.

A table is presented below, showing the species and genera of fossil Syrphids placed in their respective horizons. It shows that the largest number of species and genera, so far as yet discovered, occur in the Oligocene. This is certainly due to the abundance of this family in the Baltic amber (Lower Oligocene), for there are fourteen extinct genera

in this period and only five Recent ones, as compared with three extinct (possibly only two) genera and eight Recent genera in the Miocene. These figures point to a rapid process of elimination of generic types in the Lower Oligocene and a consequent period of marked transition of extinct genera to more Recent ones. Wheeler (1914) found a somewhat similar situation, when summarizing his conclusions from a study of the ants of the Baltic amber; no data are afforded as to the number of extinct genera of Miocene ants, but he notes that forty-four percent of the Lower Oligocene ant types do not appear in the Recent fauna. Wheeler further notes that Ulmer, in his study of amber Trichoptera, finds forty-six and four-tenths per cent extinct genera. Carpenter (1930) finds that forty percent of the Miocene (Florissant) genera of ants are extinct types. The percentages for Lower and Upper Oligocene and for Miocene are contrasted in the table below.

It will be seen that there is a general elimination of generic types in several groups of insects throughout this period although the extent of this elimination varies somewhat.

Lower Oligocene Amber Syrphidae	Lower Oligocene Amber Ants (Wheeler)	Lower Oligocene Amber Tipulidae	Upper Oligocene Syrphidae	Miocene Syrphidae
19 genera	43 genera	38 genera	6 genera	11 genera
14 extinct	19 extinct	9 extinct	0 extinct	3 extinct
74% "	44% "	24.% "		27% "

I am strongly inclined to believe that when *Syrphus curvipetiolatus* Meunier, the Criorrhina of Giebel, and the *Tropidia* of Handlirsch, the only modern genera remaining in the amber list except *Cheilosia* and *Myiolepta,* are located and studied, they will also prove to belong at least to extinct subgenera. Should this prove correct, the amber Syrphid fauna would consist of over ninety percent extinct forms, and we would be able to say that their extinction proceeded almost twice as fast as that of ants and Trichoptera, as far as this period is concerned.

We can hardly say definitely whether a total of one hundred and fifty to two hundred specimens of amber Syrphids, out of a total number of amber specimens of insects exceeding one hundred thousand and perhaps as much as one hundred and fifty thousand, is an indication of individual abundance or paucity. We know that in some communities today the Syrphid fauna is particularly rich, but almost no

satisfactory logical work has been done upon individual and species population. Mr. Charles Johnson reported finding as many as one hundred and eighteen species in one spot in New England, but this is certainly exceptional. Williston reported taking in a few days from one group of elderberry bushes as many as forty-seven species. The highest list of species from a state is perhaps that of New Jersey with about two hundred species, to which others have been added since.

As for the records of fossil species, we are safe in saying that considerable morphogenesis was taking place among Syrphids as far back as the Lower Oligocene, and almost surely extending back well into the Eocene, since at least six of the seven principal subfamilies had already differentiated by this time. A study of Recent types would indicate that the Syrphinae and Cheilosinae are the most generalized groups among the fourteen subfamilies. Obviously, the fossil record supports this conclusion. In a certain sense the Syrphinae represented the offshoot from which most of the plain and patterned Syrphids arose, and the Cheilosiinae, with their characteristic melanic coloring, are certainly the ancestors of the Xylotinae and the Callicerinae. In these last two subfamilies the dark or aeneous coloration becomes the commonplace, and so perhaps they are ancestral to all of these melanoid and aeneous types. Many Syrphid genera secondarily acquire a paler appearance owing to the strong development of light yellow pile and pale, even silvery pubescence. One is tempted to believe that the possible desirability of pale coloration provides an explanation for the abundance of the sheen-like pubescence and pollen of many forms; nevertheless, this is conjecture.

It seems fairly certain, in view of the decided differentiation of the two main subfamilies in the Eocene, as well as the beginnings surely of two others, that the Syrphidae originated sometime in the late Cretaceous. The flora of this period, containing as it did *Platanus, Fagus, Quercus, Viburnum, Liriodendron, Acer, Liquidamber*, etc., in short many recent deciduous types of shrubs and trees, might easily have furnished food for Syrphids, for these flowers are highly polliniferous, and they are the genera today upon which we often find Syrphid flies, albeit there is now a distinct preference for definitely white rather than colored blossoms. It is not wholly improbable that the origin of the Syrphidae goes even farther back in time, for positively identified Tipulidae and even some higher Diptera have been found in the Jurassic.

Lastly, I think it is of interest to note that at least one very prominent Oligocene branch was highly developed in a structural sense, and

leaves not even a modified descendant today. This is the group of genera and species centering around *Palaeosphegina* and including *Palaeoascia* and *Pseudosphegina.*

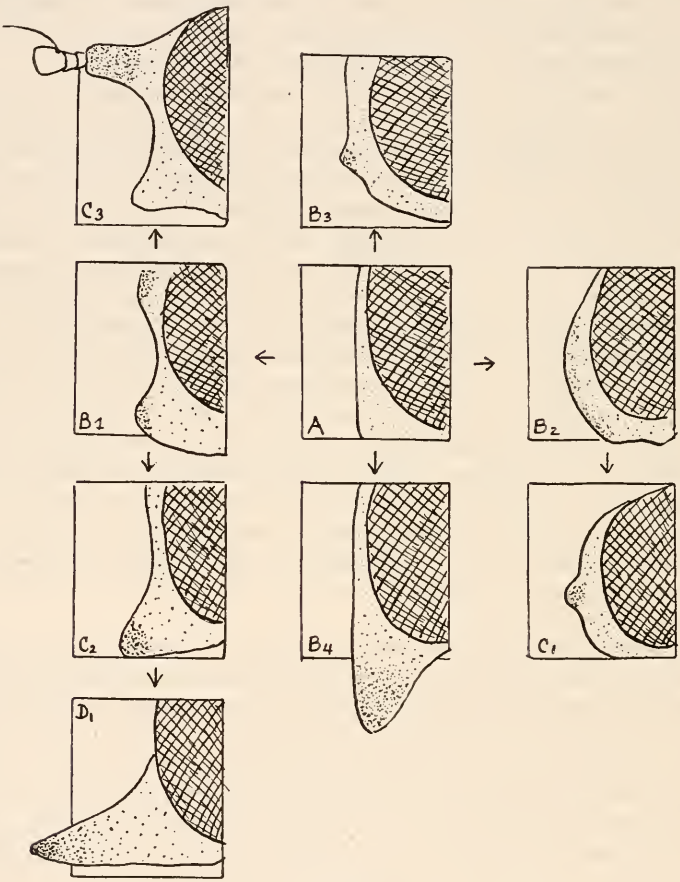

Fig. 2

2. There are two great fossil face types (middle face only considered), the tuberculate-faced flies and the epistomally produced flies. We have the choice of regarding one or the other as the more generalized. The question has particular significance if we wish prop-

erly to evaluate forms in Syrphid flies, and quite important in other families of Diptera. It seems to me that the evidence is in favor of the idea that the epistomal face is more specialized. The text figures given below illustrate the principal fossil types of face in Syrphid flies.

The following points can be urged as evidence in favor of regarding the epistomal face as more specialized:

(a) In that subfamily (Xylotinae) to which, excepting the Cerioidinae, we accord much the highest specialization, the definitely concave, "epistomal-thrust-face" is the predominant type; facial tubercles are quite scarce. Moreover, that subfamily contains very many forms with the produced front, which as an antennal prominence, necessarily borrows from the face, and which according to the concept outlined in the text figure must be derived from this same concave type. Also, the Cerioidinae, the last and most specialized subfamily, is wholly made up of such forms; the upper part of their faces is well thrust forward, although the oral margin may be slightly retreating. Since these two very specialized subfamilies contain so many derivatives of the concave face, it seems to indicate that such a face is more specialized than the convex, tubercle type. Doubtless both concave and convex face types have arisen from a more or less straight type of face as shown in text figure 2.

(b). The two lowest subfamilies on the basis of wing development, usually have a recessive epistomal (convexo-tuberculate) face.

The Oligocene types then, were more specialized in eyes and more generalized in face. The specialized acquisition of holoptic eyes has occurred many times in many families, and this acquisition should not have been difficult. At least eighty percent of Syrphid genera are holoptic. The well-known dipterist, Osten Sacken, has adduced some interesting correlations between pedestrian habits and dichopticism, and the aerial habit with its associated holopticism. In the main his views seem to be well warranted, but the exceptions of which he speaks are still largely exceptions. He is wrong in classifying *Sphegina* and *Neoascia* with the aerial flies.

(c). A very few genera have carried epistomal development to an extreme (*Rhingia, Rhinobaccha, Graptomyza, Lycastris, Lycastrirrhyncha*). I do not see how we are to avoid the contention that these are among the most specialized members of the family. Since this is a further specialization of the epistoma, it seems to me to indicate that the concave face is more specialized.

3. Concerning individual variation in fossil Syrphids, I would like to point out that *Palaeosphegina* is of peculiar interest because it displays

such a medley of variations. Out of the total of thirty-three specimens (almost twenty-five per cent of all of the amber material studied) this genus shows wide variation in many particulars, varying as much or more than one hundred per cent; it is much more variable than the closely related *Palæoascia*. This latter genus comprises an even greater percentage of my material. The material on hand in *Palaeosphegina*, may possibly represent variations produced over quite a long period of time. This may account for such a striking lot of variations in a small number of specimens, but regardless of how we account for it, the genetic pattern was evidently a highly unstable one. This genus barely differs from modern *Sphegina*, except in two points, the tuberculate face and holoptic males. That means that its legs, wings, abdomen and thorax are practically what we find in modern *Sphegina*. *Palaeosphegina* however, cannot bear the slightest connection with *Sphegina* because of its specialization in the matter of the eyes. The American species of *Sphegina* are sharply and definitely distinct, the individuals of any one species highly stable, showing as a rule, only one or two percent variation in any particular character.

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PLATES

PLATE 1

PLATE 1

A. *Cheilosia scudderi* Cockerell & Leveque; (holotype).
B. *Syrphus carpenteri* Hull; (holotype).
C. *Cheilosia miocenica* Cockerell; (holotype).

A

B

C

PLATE 2

PLATE 2

A. *Protochrysotoxum sphinx* Hull; holotype.
B. *Leucozona nigra* Hull; holotype.
C. *Pipiza melanderi* Hull; holotype.
D. *Asarcina quadrata* Scudder; holotype.

A

B

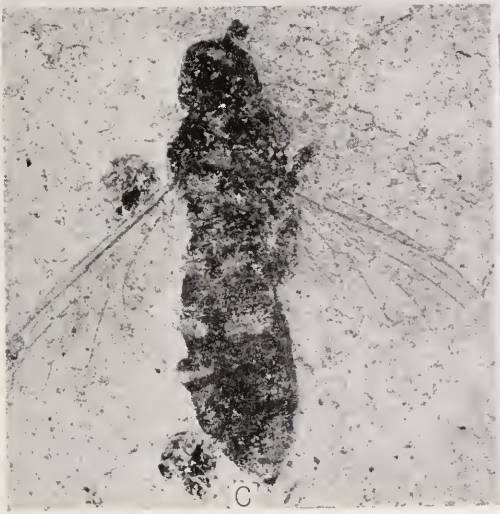
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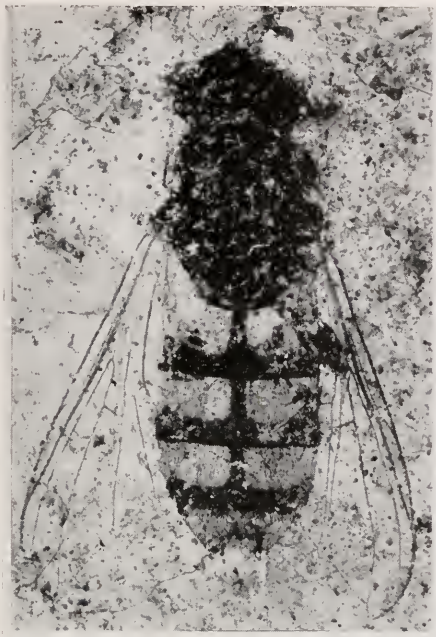
PLATE 3

PLATE 3

A. *Syrphus willistoni* Cockerell; ♀. (specimen no. 3960, M.C.Z.)
B. *Archalia femorata* Hull; holotype.
C. *Syrphus willistoni* Cockerell; allotype.
D. *Cheilosia hecate* Hull; holotype.



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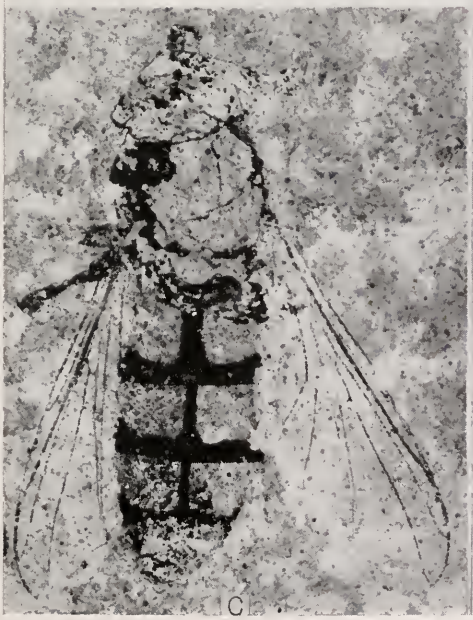
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PLATE 4

PLATE 4

Fig. 1. *Sphegina obscura* Hull; wing of female (type).
Fig. 2. *Sphegina obscura* Hull; abdomen of female (type).
Fig. 3. *Sphegina obscura* Hull; hind femur of female (type).
Fig. 4. *Platycheirus persistens* Hull; abdomen of male (type).
Fig. 5. *Platycheirus persistens* Hull; tibia and tarsi of male (type).
Fig. 6. *Syrphus willistoni* Cockerell; antenna with arista.
Fig. 7. *Palaeoeristalis tessellatus* Hull; hind femur and tibia (type).
Fig. 8. *Palaeoeristalis tessellatus* Hull; abdomen (type).
Fig. 9. *Palaeoeristalis tessellatus* Hull; wing (type).
Fig. 10. *Archalia femorata* Hull; profile of face (type).
Fig. 11. *Archalia femorata* Hull; hind femur (type).
Fig. 12. *Xylotosyrphus pulchrafenestra* Hull; hind femur (type).
Fig. 13. *Cheilosia* sp.; scutellum.
Fig. 14. *Cheilosia hecate* Hull; profile of head (paratype).
Fig. 15. *Syrphus willistoni* Cockerell; antenna with arista.

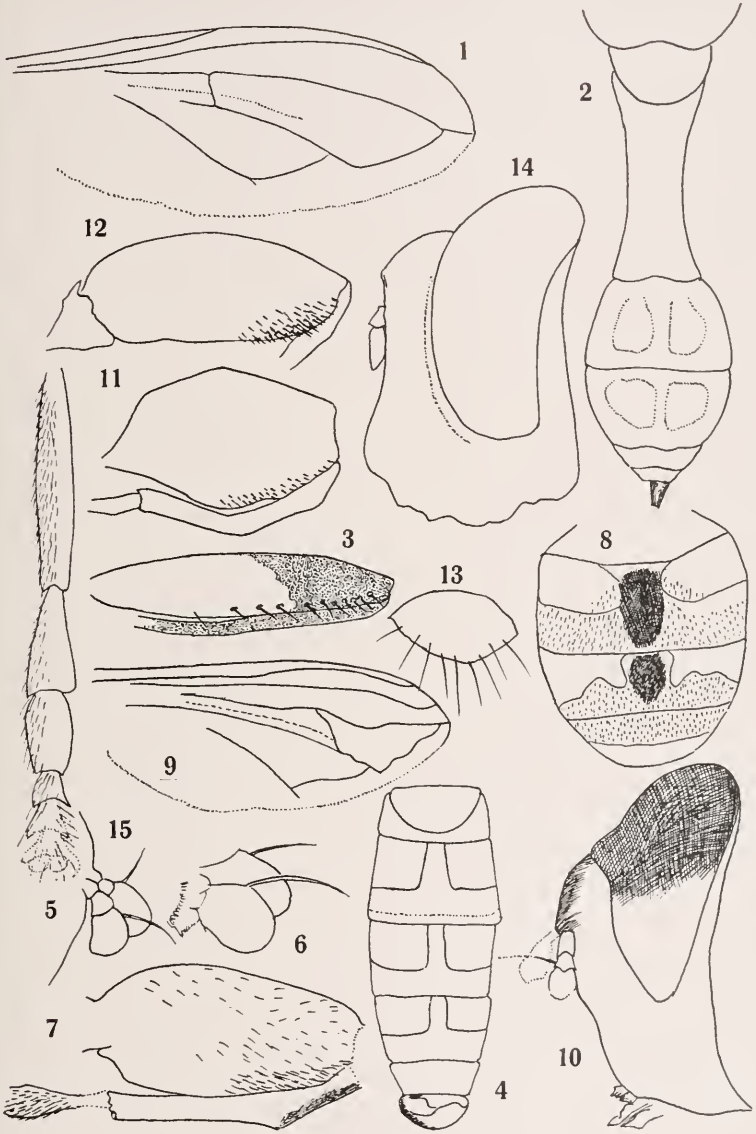
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PLATE 4

Fig. 1. *Sphegina obscura* Hull; wing of female (type).
Fig. 2. *Sphegina obscura* Hull; abdomen of female (type).
Fig. 3. *Sphegina obscura* Hull; hind femur of female (type).
Fig. 4. *Platycheirus persistens* Hull; abdomen of male (type).
Fig. 5. *Platycheirus persistens* Hull; tibia and tarsi of male (type).
Fig. 6. *Syrphus willistoni* Cockerell; antenna with arista.
Fig. 7. *Palaeoeristalis tessellatus* Hull; hind femur and tibia (type).
Fig. 8. *Palaeoeristalis tessellatus* Hull; abdomen (type).
Fig. 9. *Palaeoeristalis tessellatus* Hull; wing (type).
Fig. 10. *Archalia femorata* Hull; profile of face (type).
Fig. 11. *Archalia femorata* Hull; hind femur (type).
Fig. 12. *Xylotosyrphus pulchrafenestra* Hull; hind femur (type).
Fig. 13. *Cheilosia* sp.; scutellum.
Fig. 14. *Cheilosia hecate* Hull; profile of head (paratype).
Fig. 15. *Syrphus willistoni* Cockerell; antenna with arista.

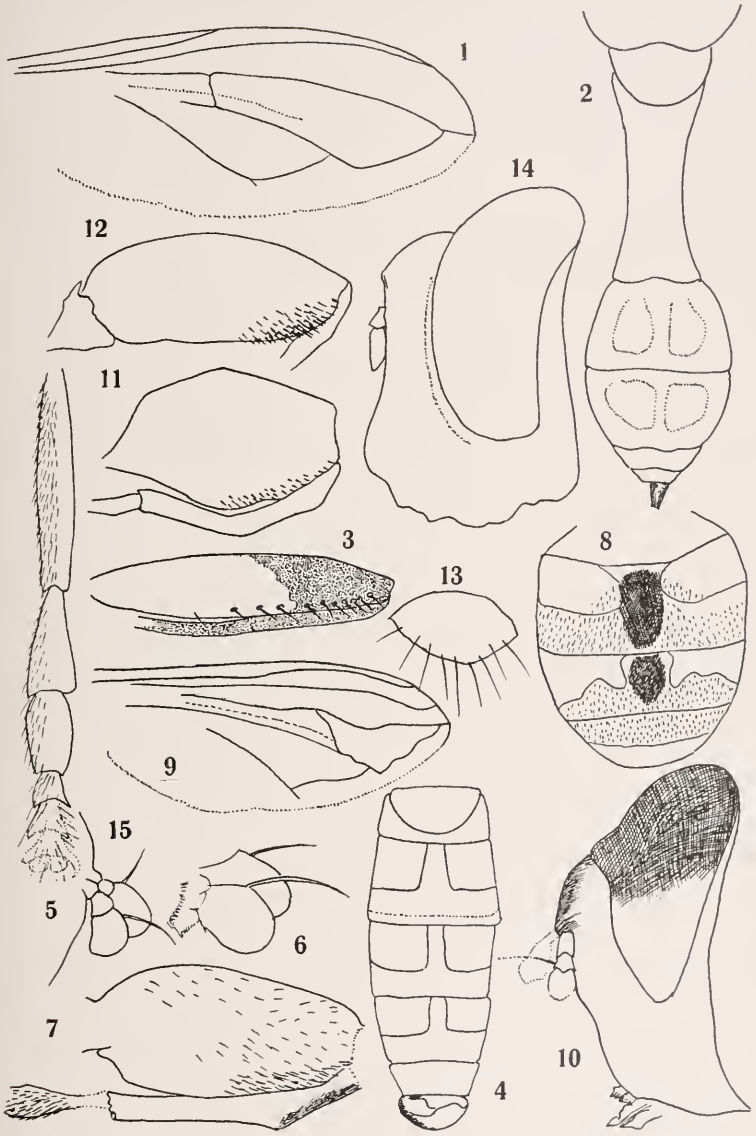
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PLATE 5

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Fig. 16. *Palaeoascia uniappendiculata* Meunier; hind femur (male).
Fig. 17. *Palaeoascia uniappendiculata* Meunier; face from in front.
Fig. 18. *Palaeoascia uniappendiculata* Meunier; antenna with arista (type).
Fig. 19. *Palaeoascia uniappendiculata* Meunier; abdomen of male.
Fig. 20. *Palaeoascia uniappendiculata* Meunier; abdomen of female.
Fig. 21. *Palaeoascia atrata* Hull; wing tip.
Fig. 22. *Palaeoascia atrata* Hull; wing tip.
Fig. 23. *Palaeoascia atrata* Hull; abdominal segment and genitalia of male
Fig. 24. *Palaeoascia atrata* Hull; antenna with arista.
Fig. 25. *Syrphus aphidopsidis* Cockerell; antenna (obverse of type).
Fig. 26. *Merodon germari* Heyden; abdomen and hind legs (type).

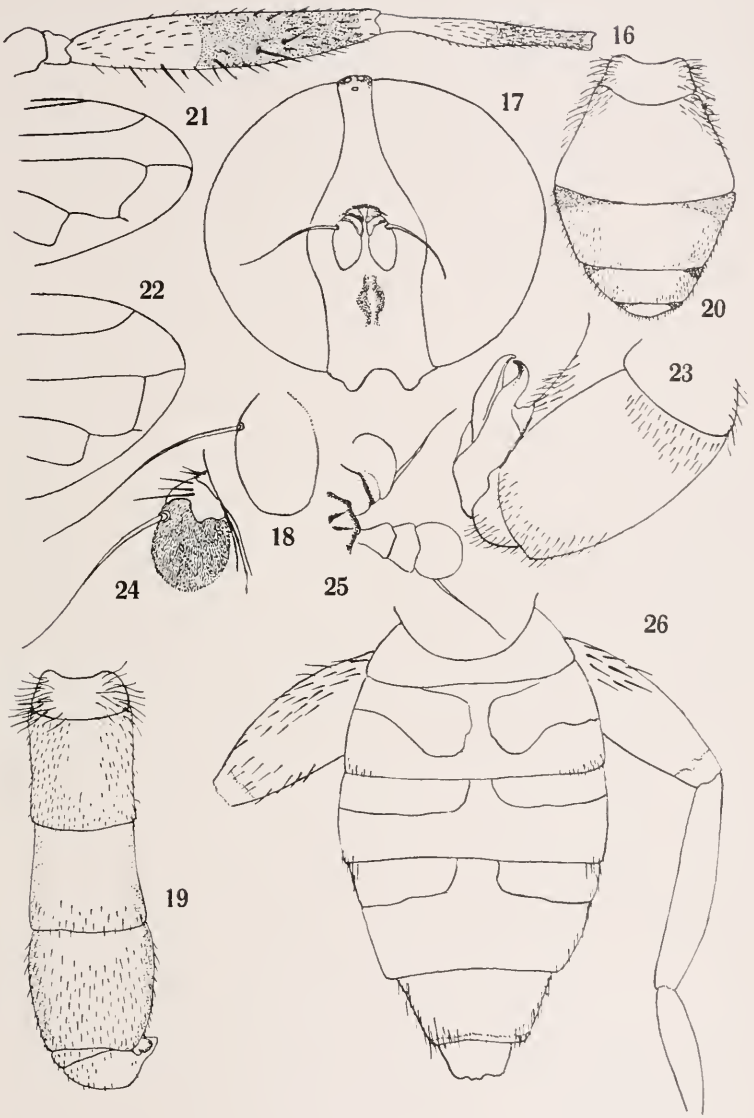
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PLATE 6

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Fig. 27. *Pseudosphegina dichoptica* Hull; head from above (type).
Fig. 28. *Pseudosphegina dichoptica* Hull; hind femur and tibia (type).
Fig. 29. *Eoxylota pulchra* (Meunier); hind femur, tibia and basi tarsi (type).
Fig. 30. *Eoxylota pulchra* (Meunier); profile of head (type).
Fig. 31. *Ptilocephala volucelloides* Hull; profile of head (type).
Fig. 32. *Ptilocephala volucelloides* Hull; wing (type).
Fig. 33. *Ptilocephala volucelloides* Hull; hind femur and tibia (type).
Fig. 34. *Ptilocephala volucelloides* Hull; thora and scutellum (type).
Fig. 35. *Ptilocephala volucelloides* Hull; antenna with arista (type).
Fig. 36. *Arctolepta calamitans* Hull; scutellum (type).
Fig. 37. *Cacogaster novamaculata* Hull; head from above (type).

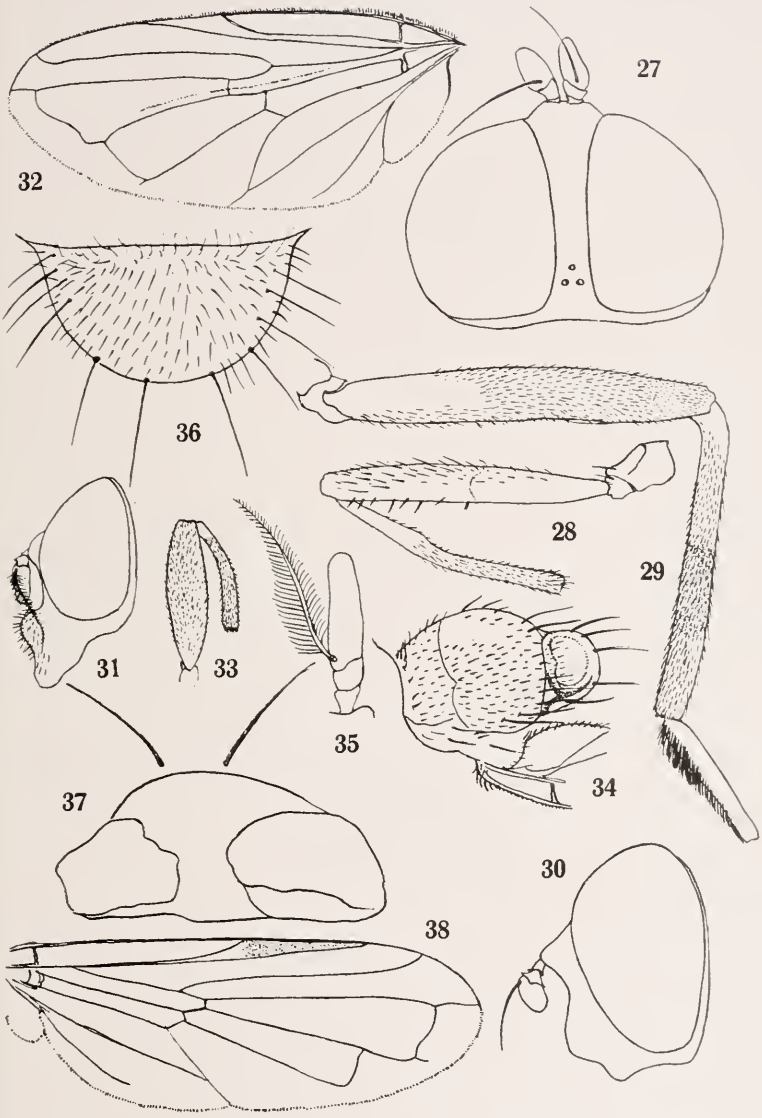
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PLATE 7

PLATE 7

Fig. 38. *Pseudosphegina dichoptica* Hull; wing (type).
Fig. 39. *Pseudosphegina dichoptica* Hull; abdomen and hypopygium (type)
Fig. 40. *Megaxylota magnifemur* Hull; abdomen of female (type).
Fig. 41. *Megaxylota magnifemur* Hull; wing (type).
Fig. 42. *Megaxylota magnifemur* Hull; head from above.
Fig. 43. *Palaeoascia uniappendiculata* Meunier; hind femur of male.
Fig. 44. *Palaeoascia uniappendiculata* Meunier, var. *brachypennis* Hull; hind femur.
Fig. 45. *Palaeoascia uniappendiculata* Meunier; head of female from above.
Fig. 46. *Palaeoascia uniappendiculata* Meunier, var. *brachypennis* Hull; wing.
Fig. 47. *Palaeoascia uniappendiculata* Meunier; hind femur.
Fig. 48. *Palaeoascia uniappendiculata* Meunier; head of male from above.
Fig. 49. *Palaeoascia nigra* Hull; head in profile (type).
Fig. 50. *Spheginascia biappendiculata* Meunier; wing (type).

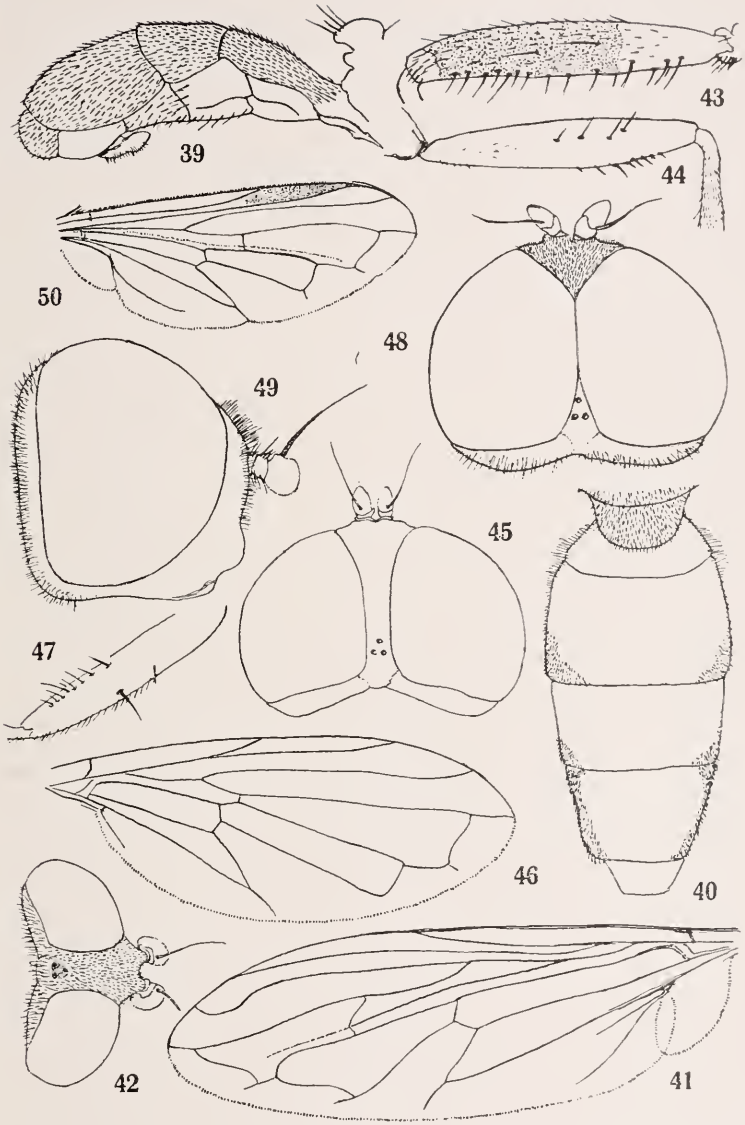
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PLATE 8

PLATE 8

Fig. 51. *Palaeoascia uniappendiculata* Meunier; lateral view (type).
Fig. 52. *Megaxylota magnifemur* Hull; profile of head (type).
Fig. 53. *Megaxylota magnifemur* Hull; hind femur and tibia (type).
Fig. 54. *Cheilosialepta baltica* Hull; antenna and arista.
Fig. 55. *Palaeopipiza xenos* Meunier; antenna and arista (type).
Fig. 56. *Palaeopipiza xenos* Meunier; profile of head (type).
Fig. 57. *Palaeopipiza xenos* Meunier; scutellum (partial reconstruction from type).
Fig. 58. *Doliomyia chalybea* Hull; scutellum (type).
Fig. 59. *Doliomyia chalybea* Hull; head from above (type female).
Fig. 60. *Merodon germari* Heyden; head from above (type).

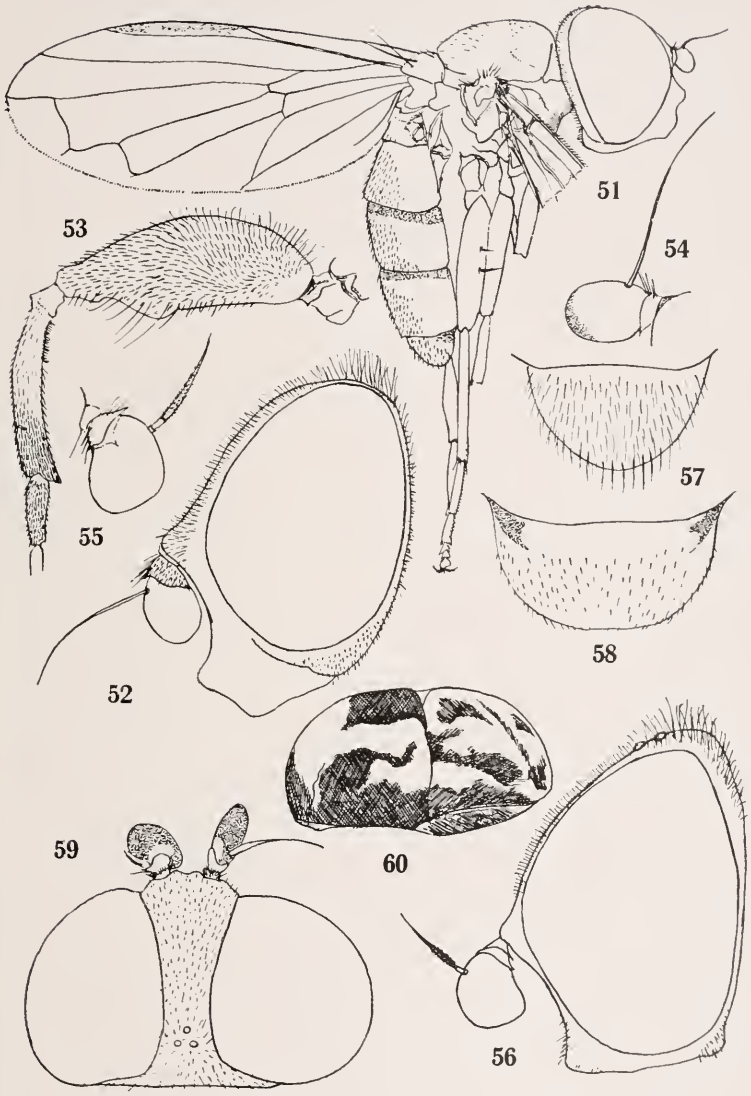
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PLATE 9

PLATE 9

Fig. 61. *Spheginascia biappendiculata* Meunier; wing (type).
Fig. 62. *Doliomyia chalybea* Hull; profile of head (type).
Fig. 63. *Palaeosphegina elegantula* Meunier; hind femur and tibia (type).
Fig. 64. *Palaeosphegina elegantula* Meunier; tibia and basitarsus (type).
Fig. 65. *Palaeosphegina elegantula* Meunier; profile of head (type).
Fig. 66. *Spheginascia biappendiculata* Meunier; profile of head (type).
Fig. 67. *Cheilosialepta baltica* Hull; head from above, male.
Fig. 68. *Cheilosialepta baltica* Hull; head from oblique view.
Fig. 69. *Cheilosialepta baltica* Hull; scutellum.

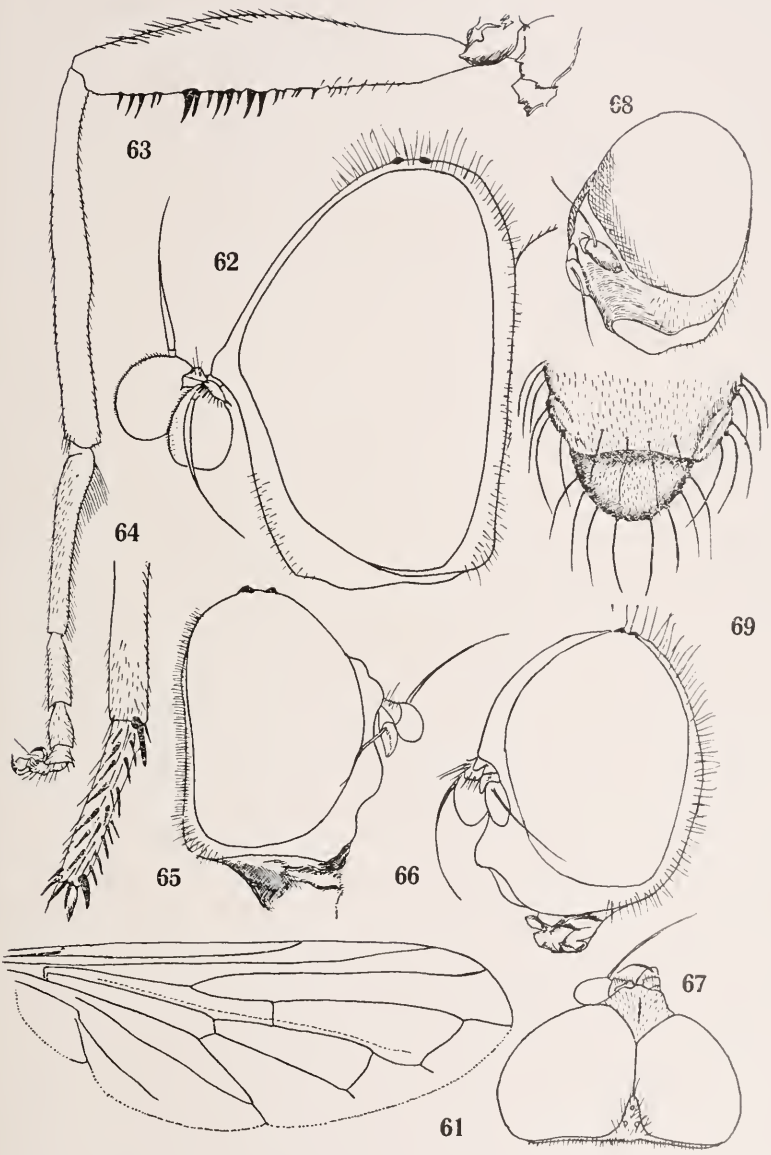
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PLATE **10**

PLATE 10

Fig. 70. *Spheginascia biappendiculata* Meunier; head from above (type).
Fig. 71. *Spheginascia biappendiculata* Meunier; profile of head (type).
Fig. 72. *Eoxylota pulchra* (Meunier); abdomen (type).
Fig. 73. *Eoxylota pulchra* (Meunier); wing (type).
Fig. 74. *Arctolepta calamitans* Hull; head from below (type).
Fig. 75. *Arctolepta calamitans* Hull; scutellum (type).
Fig. 76. *Arctolepta calamitans* Hull; wing (type).
Fig. 77. *Protorhingia carpenteri* Hull; wing (type).
Fig. 78. *Protorhingia magnipennis* Hull; wing (type).
Fig. 79. *Cheilosialepta baltica* Hull; wing.

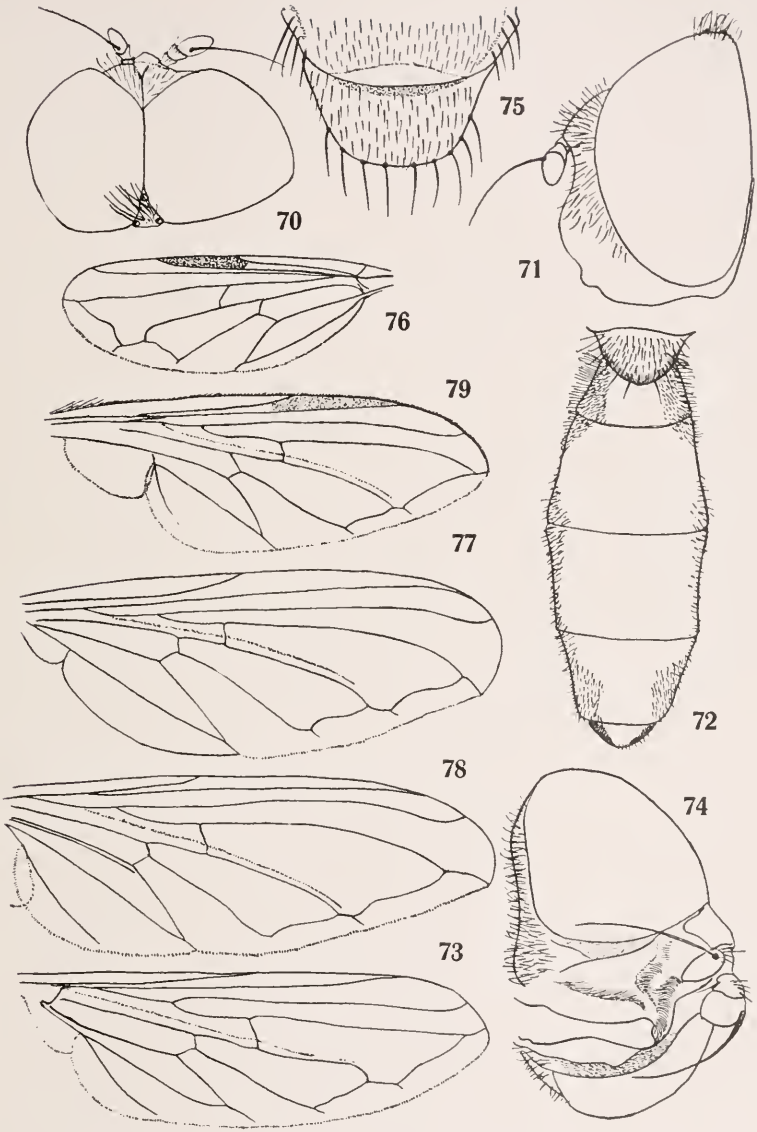
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PLATE **11**

PLATE 11

Fig. 80. *Cheilosia nigrachaeta* Hull; profile of face.
Fig. 81. *Pseudosphegina withersi* Hull; face from above.
Fig. 82. *Pseudosphegina withersi* Hull; profile of face.
Fig. 83. *Cheilosia germanica* Hull; profile of face.
Fig. 84. *Sericolepta maculata* Hull; face from above.
Fig. 85. *Sericolepta maculata* Hull; antenna from outside.
Fig. 86. *Pseudopipiza antiqua* Hull; profile of face.
Fig. 87. *Sericolepta maculata* Hull; profile of face.
Fig. 88. *Myiolepta andreei* Hull; profile of face.
Fig. 89. *Myiolepta valida* Hull; face from above.
Fig. 90. *Cheilosia bruesi* Hull; face from above.
Fig. 91. *Myiolepta germanica* Hull; profile of face.
Fig. 92. *Myiolepta germanica* Hull; face from above.
Fig. 93. *Cheilosia pratjei* Hull; face from above.
Fig. 94. *Cheilosia pratjei* Hull; hind femur.
Fig. 95. *Cheilosia germanica* Hull; hind femur.
Fig. 96. *Pseudopipiza europa* Hull; vertex, occiput and ocelli.

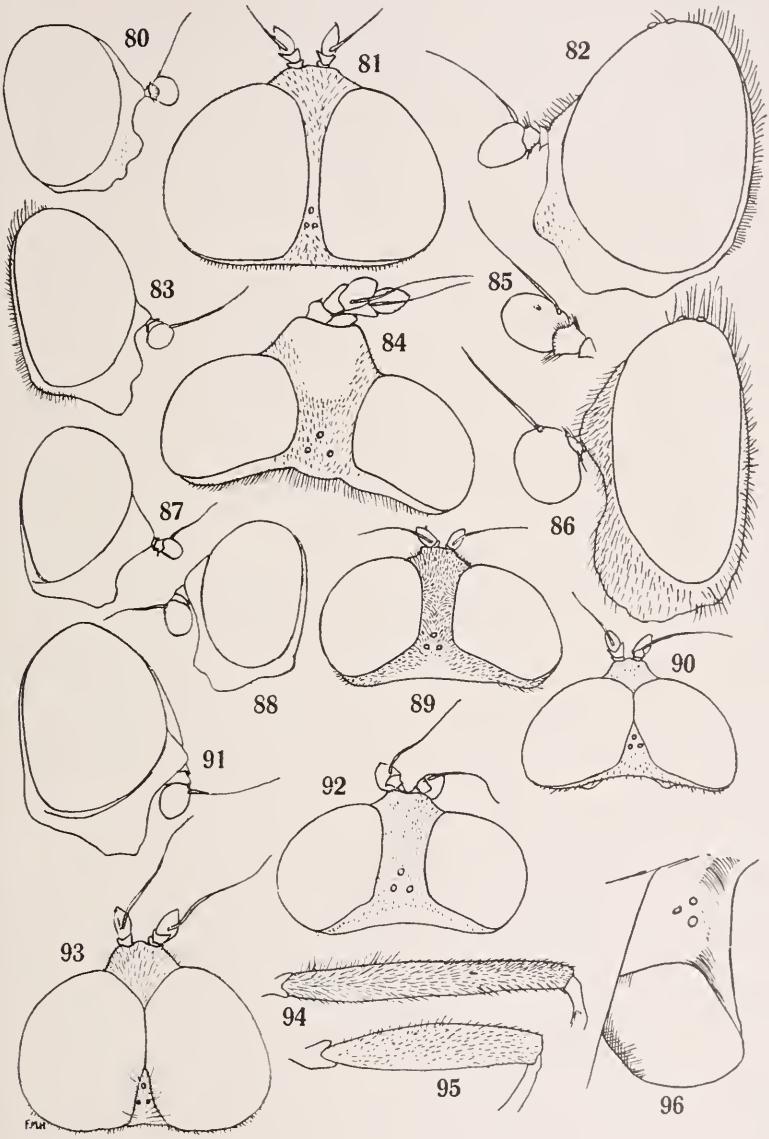
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PLATE 12

PLATE 12

Fig. 97. *Myiolepta valida* Hull; scutellum.
Fig. 98. *Cheilosia bruesi* Hull; scutellum.
Fig. 99. *Cheilosia germanica* Hull; scutellum.
Fig. 100. *Sericolepta maculata* Hull; scutellum.
Fig. 101. *Myiolepta germanica* Hull; scutellum.
Fig. 102. *Cheilosia nigrachaeta* Hull; scutellum.
Fig. 103. *Myiolepta andreei* Hull; scutellum.
Fig. 104. *Cheilosia pratjei* Hull; scutellum.
Fig. 105. *Myiolepta andreei* Hull; hind femur and tibia.
Fig. 106. *Myiolepta germanica* Hull; hind femur and tibia.
Fig. 107. *Cheilosia nigrachaeta* Hull: wing.
Fig. 108. *Myiolepta valida* Hull; wing.
Fig. 109. *Sericolepta maculata* Hull; abdomen.
Fig. 110. *Sericolepta maculata* Hull; hind femur and tibia.

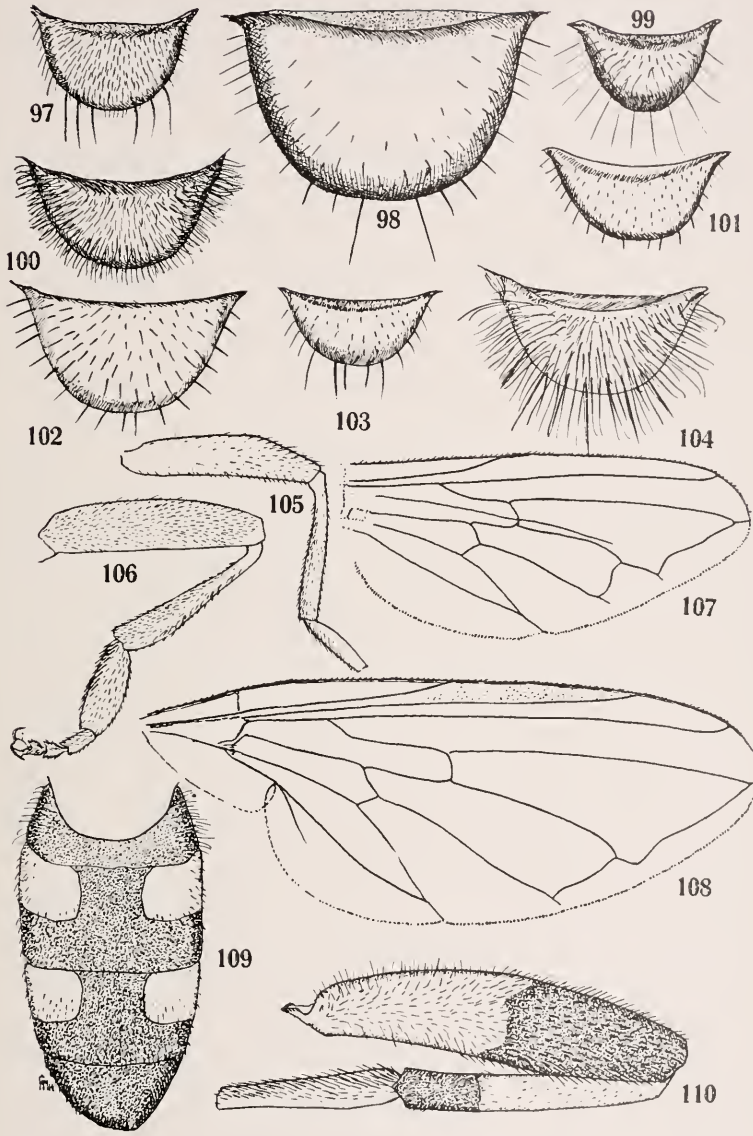
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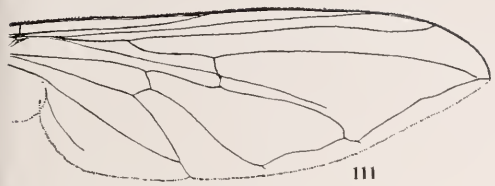
PLATE 13

PLATE 13

Fig. 111. *Cheilosia pratjei* Hull; wing.
Fig. 112. *Cheilosia germanica* Hull; wing.
Fig. 113. *Pseudopipiza antiqua* Hull; wing.
Fig. 114. *Myiolepta andreei* Hull; wing.
Fig. 115. *Pseudosphegina withersi* Hull; wing.
Fig. 116. *Doliomyia chalybea* Hull; wing.
Fig. 117. *Palaeopipiza xenos* Meunier; wing. From type.
Fig. 118. *Cheilosia bruesi* Hull; wing.
Fig. 119. *Sericolepta maculata* Hull; wing.
Fig. 120. *Myiolepta germanica* Hull; wing.
Fig. 121. *Pseudopipiza europa* Hull, wing.



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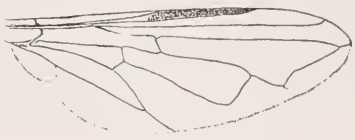

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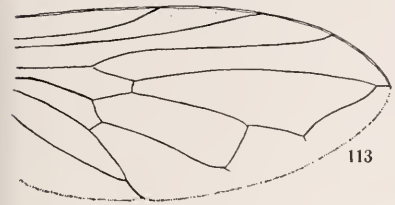

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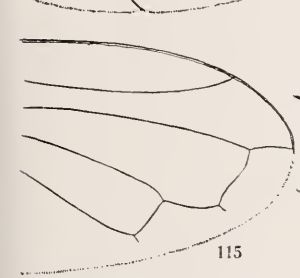

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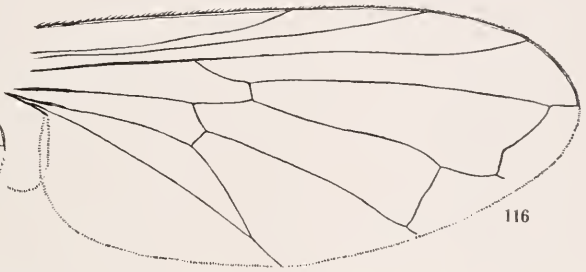

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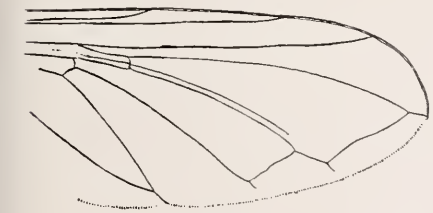

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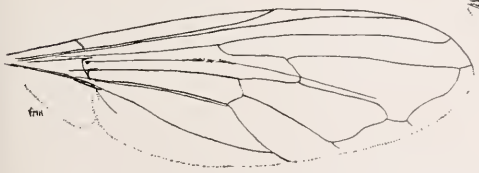

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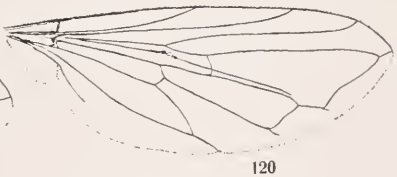

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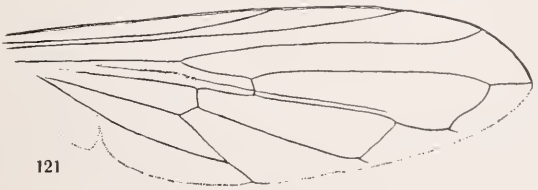

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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
Vol. XCV, No. 4

THE ARGIOPIDAE OF HISPANIOLA

By Elizabeth B. Bryant

With Four Plates

CAMBRIDGE, MASS., U. S. A.
PRINTED FOR THE MUSEUM
May, 1945

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OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE

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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
VOL. XCV, No. 4

THE ARGIOPIDAE OF HISPANIOLA

BY ELIZABETH B. BRYANT

WITH FOUR PLATES

CAMBRIDGE, MASS., U. S. A.
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MAY, 1945

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No. 4. — *The Argiopidae of Hispaniola*[1]

By Elizabeth B. Bryant

Many of the Argiopidae are large and showy spiders, but though calculated to attract the attention of collectors, only one species was first described from Hispaniola. In 1895, E. Simon founded the genus *Alcimosphenus* on the species *licinus*, from S. Domingo and Jamaica. It has since been found on several of the islands of the Caribbean, but the male is still unknown.

Mr. Banks (1903) published a brief paper entitled "A List of Arachnida from Hayti, with descriptions of New Species." This paper noted in all sixty-three species, seventeen of which belong to the family Argiopidae, though today several are regarded as synonyms. *Eustala prompta* (Hentz) = *anastera* Walck., has not been found again on the island, though it is common on many of the Antilles; *Wagneriana unidem-tuberculata* (Keys.) has been found on several of the islands of the Caribbean and may be rediscovered on Hispaniola when collections are made at different seasons. *Singa crewi* Banks, described as new from a female, has recently been rediscovered with the male at Port-au-Prince, the type locality.

The classification of the Argiopidae is probably as satisfactory as that of any other large and widely distributed group, where the male and female differ greatly in size, color and secondary characters. While it is often difficult to place the females in the various subfamilies, males are distinguished by one or more striking characters. F.O.P.-Cambridge in his "Arachnida of Central-America", established a number of new genera, but even in so restricted an area, he was obliged to relegate several species, known from both sexes, to the genus *Aranea*, for lack of definite characters, though he stated that no Central American species was congeneric with the European genotype. The same is true of the fauna of Hispaniola. Many of the Central American genera of F.O.P.-Cambridge have been found on that island, but no species of *Aranea*, as restricted today.

In all, the writer has seen fifty-nine species of the Argiopidae. Some of these are widely distributed, like *Nephila clavipes* (Linn.), found everywhere in the tropics of the New World; *Cyclosa oculata* (Walck.), first reported from the vicinity of Paris, an undoubted horticultural importation, and known today from northern South America and most of the islands of the Caribbean; *Wendilgarda theridionina* Simon, described first from Venezuela and since found to be widely distributed; *Acacesia hamata* (Hentz), a common species

[1] Published with the aid of a special gift from Mr. George R. Agassiz.

in the southern part of the United States, is also found on many of the islands; *Parawixia cambridgei* Bryant, so far known only from the type locality, Pico Turquino, Eastern Cuba. Two genera are definitely of South American origin, *Agriognatha* and *Ogulnius*. The former is based on a species from Peru, known by both male and female. Three species have been found in Central America, one is reported from St. Vincent and three additional species have been added from Hispaniola. The genus *Ogulnius* was based on probably the smallest spider known (0.5 mm. long) from the Amazon. Two more species of this genus have been reported from St. Catharina, Brazil, one from the island of St. Vincent, and another from the foot-hills of the Cordillera Central, south of Santiago, Hispaniola.

Of the fifty-nine species seen, twenty-seven are described as new. Many of these are small, less than 2.0 mm. in length, and were taken by Dr. P. J. Darlington on isolated peaks of the Hispaniola mountains, indicating a restricted distribution.

I gladly express my appreciation of the skill and understanding of Dr. Darlington, who has collected so much of the material upon which this paper is based. My sincere thanks are also due to Dr. Alexander Petrunkevitch, who so kindly compared specimens of *Singa crewi* Banks with his type of *Larinia coamensis* Petr. from Puerto Rico; to Dr. W. M. Mann, who collected in Haiti during the winter of 1912–1913, taking several species not found by other collectors; to Dr. André Audant, I am indebted for several interesting species; to Donald Hurst for material from Puerto Plata. I am especially grateful to Mr. Nathan Banks for never failing interest and encouragement.

Family ARGIOPIDAE

Key to Subfamilies of Argiopidae found in Hispaniola

1. Small spiders; eyes heterogeneous; central spinners with posterior pair form a straight line ..... *Theridiosomatinae*
   Larger spiders; eyes homogeneous; spinners closely grouped 2
2. Mandibles usually without a boss, or boss rudimentary; genital fold without a furrow; legs with hairs or bristles or few spines 3
   Mandibles with a boss; genital fold with a furrow; legs with true spines .. 4
3. Boss absent; paracymbium of male palpus long, narrow and parallel to cymbium ..... *Tetragnathinae*
   Boss rudimentary; paracymbium short, chitinized and at right angles to cymbium ..... *Metinae*

4. Legs very long, metatarsi and tarsi longer than tibia and patella 5
   Legs relatively shorter, metatarsi and tarsi shorter than patella and tibia . 6
5. Vulva of female simple; posterior eye row straight; carapace convex; labium longer than broad . . . . . *Nephilinae*
   Vulva of female developed; posterior eye row strongly procurved; carapace flat, labium broader than long . . . . . *Argiopinae*
6. Spinners surrounded by a corneous ring; abdomen hard . . *Gasteracanthinae*
   Spinners not surrounded by a corneous ring; abdomen soft . . . . . *Araneinae*

Subfamily ARGIOPINAE

Key to species

1. Eyes of anterior row equidistant . . . . . *Gea heptagon*
   A.M.E. further from laterals than from each other 2

Females

2. Abdomen lobate on sides . . . . . *Argiope argentata*
   Abdomen evenly rounded on sides . . . . . *Argiope trifasciata*

Males

   Embolus with lateral barbs near tip . . . . . *Argiope argentata*
   Embolus smooth . . . . . *Argiope trifasciata*

Genus Argiope Audouin 1826

Argiope argentata (Fabr.)

Aranea argentata Fabricius, 1775, p. 433. [♀] "in Indiis"

3 ♂ ♀ Dom. Rep.; Puerto Plata, April–May 1941, (Hurst)
♂ ♀ Haiti; Diquini, November 1912, (Mann)
♀ Haiti; Port-au-Prince, 2 October 1934, (Darlington)
♀ Haiti; Kenskoff, 4,300 feet, May 1935, (Roys)

Argiope trifasciata (Forskål)

Aranea trifasciata Forskål, 1775, p. 86. [♀] "Kahirae"

♀ *pullus* Haiti; Kenskoff, 4,300 feet, 2 May 1935, (Roys)

Genus Gea C. Koch 1843

Gea heptagon (Hentz)

Epeira heptagon Hentz, 1850, p. 20, pl. 3, figs. 5, 6; reprint, 1875, p. 122, pl. 14, figs. 5, 6, "♂ ♀ North Carolina; Alabama"

♀ Haiti; Ennery, 10 September 1934, (Darlington)
♀ Dom. Rep.; Puerto Plata, April–May 1941, (Hurst)

Subfamily ARANEINAE

Key to Genera

Males

1. Patella of palpus with 2 spines at apex 2
   Patella of palpus with 1 spine at apex 5
2. First coxa without a hook . . . . . *Metepeira*
   First coxa with a hook 3
3. Lateral eyes on a prominent tubercle projecting forward in advance of anterior margin of mandible; palpus without a large paracymbium . . . . *Eriophora*
   Lateral eyes not on a prominent tubercle, palpus with a large paracymbium 4
4. Clavis of genital bulb with a characteristic lateral spur, but not distinctly bifid . . . . . *Neoscona*
   Clavis of bulb distinctly bifid . . . . . *Neosconella*
5. Third tibia with tuft of cilia on anterior basal side . . . . . *Mangora*
   Third tibia with no tuft of cilia 6
6. First coxa without a hook, anterior row of eyes strongly procurved . . . . . *Marxia*
   First coxa with a hook, anterior row of eyes straight or slightly recurved . 7
7. Second tibia with a stout apophysis about middle 8
   Second tibia with no apophysis about middle 9
8. Apophysis with two stout spines at apex . . . . . *Verrucosa*
   Apophysis more slender with a single, long stout apical spine . . . . *Edricus*
9. Quadrangle of eyes not narrowed behind, p.m.e. two diameters apart and larger than a.m.e. . . . . *Wixia*
   Quadrangle of eyes narrowed behind, p.m.e. one diameter apart, smaller than a.m.e. 10
10. Eye groups very prominent, lateral eyes on a tubercle that projects beyond anterior margins of mandibles 11
    Eye groups not prominent, lateral eyes not projecting forward 12
11. Second tibia incrassate, with a prolateral double row of 5–6 stout spines, 5–6 long ventral spines, third and fourth femora with 5–6 ventral spines . . . . . *Parawixia*
    Second tibia scarcely incrassate, with a single prolateral series of three fine spines, third and fourth femora without spines, or one or two on third femur . . . . . *Cyclosa*
12. Abdomen with shoulder, lateral and apical cusps . . . . . *Wagneriana*
    Abdomen without cusps 13
13. Second tibia with specialized holding spines, joint somewhat incrassate . 14
    Second tibia not incrassate, nor with any specialized holding spines 15

14. Specialized spines not arranged in a series but with two or more spines towards base, one or two very long curved prolateral spines, one or two shorter, stouter curved ventral spines ..... *Acacesia*
    Specialized spines arranged in a more or less definite series..... *Eustala*
15. Posterior femora with ventral spines, fourth coxa not modified..... *Metazygia*
    Posterior femora with no ventral spines, fourth coxa with a short black spine on posterior margin ..... *Aranea*(?)

Females

1. Abdomen with cusps or tubercles 2
   Abdomen with no cusps or tubercles 8
2. A dorsal basal tubercle as well as lateral tubercles ..... *Marxia*
   No dorsal basal tubercle 3
3. Femora with ventral spines 4
   Femora with no ventral spines 5
4. Metatarsi with no ventral spines, scapus very long ..... *Verrucosa*
   Metatarsi with few ventral spines, scapus short ..... *Parawixia*
5. P.M.E. larger than A.M.E. ..... *Wixia*
   P.M.E. smaller than A.M.E. 6
6. Cephalic portion not separated from thoracic by a semi-circular furrow.. *Wagneriana*
   Cephalic portion separated from thoracic by a deep semi-circular furrow .7
7. Median quadrangle of eyes narrower behind ..... *Cyclosp*
   Median quadrangle of eyes not narrowed behind ..... *Edricus*
8. Third tibia with tuft of curved cilia on anterior basal side..... *Mangora*
   Third tibia with no tuft of curved cilia 9
9. Femora with ventral spines 10
   Femora with no ventral spines 12
10. First metatarsus + tarsus longer than first tibia + patella, scapus recurved ..... *Metepeirs*
    First metatarsus + tarsus shorter than first tibia + patella..... 1*a*
11. Scapus very long *Eriophor*1
    Scapus very short ..... *Neoscona*
12. First and second tibiae with ventral spines 1*a*
    First and second tibiae with no ventral spines *Neosconell*3
13. Anterior margin of cephalothorax very broad ..... *Metazygia*
    Anterior margin of cephalothorax narrow 14
14. Scapus directed forward ..... *Eustala*
    Scapus directed backward 15
15. Scapus short and broad, spiders small ..... *Aranea*(?)
    Scapus protruding from plane of abdomen, spiders larger ..... *Acacesia*

Genus Acacesia Simon 1875

Acacesia hamata (Hentz)

Epeira ? hamata Hentz, 1847, p. 474, pl. 31, fig. 10; reprint, 1875, p. 114, pl. 13, fig. 10. "♂ Alabama, August"
Epeira foliata id., ibid., p. 475, pl. 31, fig. 14; reprint, p. 116, pl. 13, fig. 14. "♀ Alabama, June, July"
Epeira folifera Marx, 1889, p. 545
Araneus hallucinor Petrunkevitch, 1911, p. 296.

3 ♂ Haiti; Port-au-Prince, (Crew), Banks Coll.

Genus Aranea Linnaeus 1756

Aranea (?) crewi (Banks)

Figures 1, 3

Singa crewi Banks, 1903, p. 342, pl. 15, fig. 8. "♀ Hayti"
Larinia coamensis Petrunkevitch, 1930, p. 335, figs. 221–224. "♀ Coamo Springs, Porto Rico"

Male. Length, 4.0 mm., ceph. 2.0 mm. long, 1.6 mm. wide, abd. 2.6 mm.

Cephalothorax olivaceous, margins and median line clouded with black, eye area dark, quite low and flat, highest anterior to groove and gibbose each side of groove, sides gently rounded, anterior margin abruptly narrowed, a long bristle posterior to lateral eyes, thoracic groove long and distinct, no median row of short bristles posterior to second eye row as in female; *eyes* cover entire anterior margin, anterior row strongly recurved, eyes equidistant, a.m.e. largest of the eight, carried forward, separated by less than a diameter, a.l.e. about a radius of a.m.e., posterior row slightly recurved, lateral eyes subequal and almost touching, p.m.e. little larger than p.l.e., separated by a line; *quadrangle* wider in front, longer than wide; *clypeus* almost wanting below a.m.e.; *mandibles* vertical, long, weak, basal half swollen; *labium* pale, fused to sternum, tip strongly rebordered; *maxillae* pale, more than twice as long as labium, inner margins parallel, tips widened; *sternum* about two-thirds as wide as long, black, with a pale median stripe from labium to beyond the middle, carried between II and III coxae, IV coxae almost touching, with a basal tubercle and a short black spine on posterior margin, I coxae with a hook at retrolateral angle, and a large basal tubercle; *abdomen* pale, black at base and sides, oval, flattened with a pair of faint gray lines that form an indistinct folium, two pairs of muscle spots, venter

dark, with a pale median spot; *legs* much broken, 1–2–4–3, femora pale, with distal dark bands, tibiae with dark basal and distal dark bands, spines, I pair, femur, ventral, 3 short spines about middle, prolateral, 3, dorsal, 4 median, patella, 1 long spine at tip, 1 at base, retrolateral, 2, prolateral, 0, tibia, scattered spines, II pair not enlarged, with no specialized spines, femur, ventral, 2 short spines about middle, patella same as I pair, tibia, spines heavier than I pair, III pair, femur, ventral, 2 short spines about middle, patella, 1 at tip and 1 at base, lateral, 1–1, tibia, scattered, IV pair, coxa, 1 long sharp spine on posterior margin, femur, ventral, 3 very long spines near base, patella, 1 at tip, 1 at base, lateral, 1–1; *palpus* shorter than cephalothorax, patella as long as wide, 1 very long bristle at tip, tibia shorter than patella, with 1 very long bristle, palpal organ large, cymbium with a deep notch on retrolateral side with a slender lobe that ends in a long white bristle, ending near tip of cymbium, embolus near tip, a long, slender black tube beneath a broad, thin sheath.

Allotype ♂ Dom. Rep.; Puerto Plata, July 1940, (Hurst)

♂ ♀ Dom. Rep.; Puerto Plata, July, August 1940, (Hurst)

♂ ♀s Haiti Port-au-Prince, July 1941, (Audant)

Singa crewi Banks was based on a female, probably collected near Port-au-Prince. The description of the color markings is quite complete, but no mention is made of the eye arrangement, spines on the legs or the epigynum, a figure of which is not very clear. Petrunkevitch who redescribed this species as *Larinia coamensis*, also from a female, collected near Coamo Springs, Puerto Rico, figures the entire spider, eyes and epigynum. His figure shows the cephalothorax much more slender than in the Hispaniola specimens, but Dr. Petrunkevitch has kindly compared a pair of the Port-au-Prince material with his type and reports them to be the same.

Larinia silvestris Bryant, known only from the type, a male, from Puerto Rico, is congeneric with *Singa crewi* Banks. Both have similar palpi, with the long embolus at the tip of the bulb, protected by a sheath-like conductor, and both have the posterior coxae of the male modified. *Larinia silvestris* has two small black cusps on the prolateral margin of the third and fourth coxae, while *Singa crewi* has a sharp black spine on the posterior margin of the fourth coxa.

These two species undoubtedly belong near *Aranea incerta* (O.P.-Cambr.), found in Mexico, Guatemala and Costa Rica. This species has great variation in size and color markings. The male has a small black cusp at the upper prolateral angle of the fourth coxae, which was not noted by either O.P.-Cambridge or F.O.P.-Cambridge.

These three species cannot be placed in either the genus *Singa* or *Larinia*, as the males of both of these genera have two stout bristles at the tip of the patella of the male palpus, a character that is apparently trivial, but is constant as far as known in all Argiopid genera. F.O.P.-Cambridge left the species *incerta* in the genus *Aranea* but states that it is not typical of the genus.

In the Hispaniola specimens of *crewi*, there is some variation in color markings in the females, but little variation in size. A few have no dark median line on the cephalothorax, or dark bands on the legs, and the dorsum is pale with dark sides that extend to the base.

ARANEA(?) HISPANIOLA spec. nov.

Figure 2

Female. Length, 4.0 mm., ceph. 1.8 mm., abd. 2.6 mm. long, 2.0 mm. wide.

Cephalothorax yellow, with a gray triangle from eyes to near posterior margin, a median row of five long, overlapping bristles to posterior eye row, anterior margin little over half the greatest width, groove a shallow depression, cephalic portion high; *eyes*, anterior row recurved, eyes equidistant, a.m.e. largest of the eight, separated by a diameter, posterior row very slightly recurved, p.m.e. two-thirds diameter of a.m.e. and separated by less than a diameter, lateral eyes contiguous, subequal and on a low tubercle; *quadrangle* wider in front than behind and wider than high; *clypeus* less than a diameter of a.m.e.; *mandibles* pale, shaded with gray, no boss, three teeth on superior margin, and three teeth on inferior margin; *labium* dark, wider than long, tip rebordered; *maxillae* more than twice as long as labium, outer half dark, sides parallel; *sternum* four-fifths as wide as long, heart-shaped, not extending between the IV coxae, black with a wide median stripe of yellow that extends past the middle, IV coxae separated by half a diameter; *abdomen* oval, anterior end extending in a slight point over cephalothorax, dorsum with a wide median dark stripe that almost covers width of abdomen, lateral margins irregular and darker, sides pale, venter with a black rectangle from fold to spinnerets containing a median pale spot below the epigynum; *legs*, 1–2–4–3, pale, with many black spots, no dark rings, spines, no ventral femoral spines, I pair, femur, prolateral, 2, each from a black spot, retrolateral, 0, dorsal, 2 on basal half, patella, prolateral, 2, retrolateral, 1, dorsal, 2, apical and basal, tibia, prolateral, 3, retrolateral, 4, dorsal, 2, ventral, 2–2, metatarsus, dorsal, 1 at base, prolateral, 2, retrolateral,

2, ventral, 2–2; posterior pairs with dorsal basal spine on tibiae; *epigynum* area wider than long, parts very pale, a broad, very short median scape with sides near tip rebordered, lateral margins of area with a broad transparent chitinized cover, the depressed area each side of scape with little structure.

Holotype ♀ Haiti; Kenskoff, 4,300 feet, 1 May 1935, (Roys)

Paratype ♀ Dom. Rep.; San Jose de las Matas, 1,500 feet+, June 1938, (Darlington)

Unfortunately the anterior legs in both type and paratype are broken, so that the relative length of the joints cannot be noted.

Genus Cyclosa Menge 1866

Cyclosa bifurca (McCook)

Cyrtophora bifurca McCook, 1887, p. 342. "♀ Florida; Merrit's Island, Indian River"

Cyclosa fissicauda O.P.–Cambridge, 1889, p. 49, pl. 9, fig. 7. "♀ Guatemala, between Dolores and Chacallal."

♀ s Dom. Rep.; Puerto Plata, April–August 1941, (Hurst)
♂ Haiti; Kenskoff, 4,300 feet, 3 May 1935, (Roys)

Cyclosa oculata (Walckenaer)

Epeira oculata Walckenaer, 1802, p. 421. "♂ ♀ Paris"

Turkheimia walckenaeri O.P.–Cambridge, 1889, p. 47, pl. 8, fig. 6. "♀ Guatemala, Volcan de Fuego and Chiacan."

♂ ♀ Haiti; Kenskoff, 4,200 feet, 2 May 1935, (Roys)
♀ Haiti; La Visite, 6,000–7,000 feet, 16–23 September 1934, (Darlington)
♀ Haiti; Furcy, Mt. Cabaio, 7,000 feet, 1940, (Folk)
♀ Dom. Rep.; Puerto Plata, April–May 1941, (Hurst)

Genus Drexelia McCook 1892

Drexelia minor spec. nov.

Figure 10

Female. Length, 5.0 mm., ceph. 2.0 mm., abd. 3.4 mm. long, 1.6 mm. wide.

Cephalothorax pale, with quite a wide dark line from p.m.e. to near posterior margin, a broken marginal dark line, cephalothorax

low and flat; *eyes* cover anterior margin, anterior row recurved, a.m.e. largest of the eight, separated by more than a diameter and from a.l.e. by fully two diameters, posterior row very slightly procurved, lateral eyes subequal and touching, p.m.e. separated by less than a radius and only slightly larger than p.l.e.; *quadrangle* broader than long, about half as wide behind as in front; *clypeus* less than a diameter of a.m.e.; *mandibles* pale, vertical; *labium* pale, wider than long, tip rebordered; *maxillae* pale, twice as long as labium and parallel; *sternum* with a wide black margin and a pale center, two-thirds as wide as long, ending in a point in front of IV coxae; *abdomen* more than twice as long as wide, extending in a point over cephalothorax, tip rounded, with five narrow dark stripes, separated by narrower pale stripes, no indication of the paired dark spots found in *D. directa* (Hentz), sides mottled, venter with a long central pale spot surrounded by a broad black frame; *legs*, 1–2–4–3, brown, pale with parallel ventral and lateral rows of black dots on femora, no ventral femoral spines, spines broken; *epigynum* a broad median scape, with tip rebordered and a large circular depression each side.

Holotype ♀ Haiti; Port-au-Prince, July 1941, (Audant)

Drexelia minor is very closely related to *D. directa* (Hentz), the genotype, but it is smaller and more delicate. An immature male, also from Port-au-Prince, has the same markings. The epigynum is much broader in proportion than in *directa* and the openings are larger.

Genus Edricus O.P.–Cambridge 1890

Edricus crassicauda (Keyserling)

Epeira crassicauda Keyserling, 1865, p. 806, pl. 18, figs. 3, 4. "♀ N. Grenada, Keyserling Collection."

♀ *pullus* Dom. Rep.; Puerto Plata, July–August 1941, (Hurst)

3 ♀ Dom. Rep.; foot hills of Cordillera Central, south of Santiago, 1,000–3,000 feet, June 1938, (Darlington)

Genus Eriophora Simon 1864

Eriophora minax (O.P.–Cambridge)

Epeira minax O.P.–Cambridge, 1893, p. 112, pl. 15, fig. 1. "♀ Mexico; Acaguizotla in Guerrero, 3,500 feet."

3 ♀ Haiti; Diquini, November 1912, (Mann)
♀ Haiti; Port-au-Prince, July 1941, (Audant)
♀ Dom. Rep.; Puerto Plata, April–May 1941, (Hurst)
♀ *pullus* Haiti; Port-au-Prince, (Crew), Banks Coll.

Genus Eustala Simon 1895

This genus was based by Simon on the species *anastera* of Walckenaer, which was described from an unpublished colored drawing by Abbot. The species varies greatly, both in size and color pattern and as it was Abbot's practice to name each spider delineated, the same species was illustrated under many names. In using the Abbot drawings, Walckenaer accepted most of these names. Hentz, whose material was from the same general region, did not have access to the Abbot figures and he added four names to the list. Later Keyserling added one more.

Many years later, McCook saw the Abbot drawings in the British Museum and he placed eleven of the Walckenaer species based on Abbot names and several of his varieties in synonymy. The result of all of this is, that we have a plethora of names for a single species. Simon and F.O.P.–Cambridge have accepted McCooks identification of this species. It has a widely known distribution from New England, south to Florida and west to Utah. F.O.P.–Cambridge reports it from Mexico, Guatemala and Costa Rica and quotes from the collector, H. H. Smith, its abundance, especially in the cacao plantations.

Cambridge states in his definition of the genus, in the Biol. Central America, vol. 2, p. 503, that the fourth femur of the male has no ventral spines. This apparently is a very variable character, as in all the specimens of *E. anastera* examined, from Massachusetts and North Carolina, the fourth femur has two converging ventral rows of spines; in four of the five species of the genus found in Hispaniola, the males have ventral spines as well as retrolateral and prolateral spines on the fourth femur. *Eustala fusco-vittata* (Keyserling) has no ventral femoral spines and it also varies from others in the genus, by the extension of the abdomen beyond the spinnerets.

In both Simon's and Cambridge's definition of the genus, the a.m.e. are described as larger than the p.m.e., with the difference greater in the male than in the female. But in *Eustala bisctosa* spec. nov. from Hispaniola, the a.m.e. are smaller than the p.m.e., in both male and female.

The palpi of all species of *Eustala* are remarkably similar, and the

epigynums in all but one species has the same general structure. *Eustala perdita* spec. nov. has a vulva that suggests *Metazygia* or *Wagneriana*. The male and female both have the same pattern of dark spots on the cephalothorax and the folium is alike in both sexes.

It is greatly regretted that the specimens of *Eustala prompta* (Hentz), (which is considered a synonym of *anastera*) identified by Banks from the vicinity of Port-au-Prince are not in the collection as no other specimen of that species has been seen from Hispaniola.

Eustala bisetosa spec. nov.

Figures 5, 6

Male. Length, 4.0 mm., ceph. 1.7 mm., abd. 2.4 mm.

Cephalothorax pale, no dark spots, cephalic portion shaded with gray, eye area carried forward and narrowed, almost as wide as long, thoracic groove long; *eyes*, both rows recurved, lateral eyes small and contiguous, a.m.e. larger than a.l.e., separated by more than a diameter, p.m.e. largest of the eight, separated by little over a radius, a long, dark bristle between a.m.e. and p.m.e.; *quadrangle* of median eyes wider in front and not as high as wide; *clypeus* about a radius of a.m.e.; *mandibles* small and vertical; *labium* as wide as long, tip pale and pointed; *maxillae* twice as long as labium, pale, inner margins parallel; *sternum* grayish, little longer than wide, ending in a slender point between fourth coxae; *abdomen* triangular, with a dark folium on distal three-quarters, a median basal spear mark extending to folium, margin of folium undulating and dark, scattered long hairs on dorsum, sides with dark flecks, venter pale; *legs* much broken, first pair very long, first coxae with hook, others not modified, femora pale at base, other joints with alternate pale and dark bands, most distinct on posterior pairs, spines, I pair, femur ventral, 2 median spines, prolateral, 2 very long spines, median and distal, and several short and weak dorsal and prolateral spines, patella, prolateral, 2, retrolateral, 1, tibia and metatarsus, spines slender; II pair, femur, ventral, 2 distal, patella, lateral, 2–2, tibia not enlarged, but all spines either heavy or modified, prolateral, 3, distal and median very heavy and from a raised base, below a ventral row of 4 shorter spines and a dorsal row of 3 spines, retrolateral, 2 very short spines; III pair, femur ventral, 2 short stout median spines from a raised base, IV pair, femur, ventral, 2 short heavy spines from a raised tubercle near base and 3 longer retrolateral distal spines; *palpus*, patella with 1 long

bristle, palpal organ with a long white clavis, embolus rather short and heavy, uncus broad with lower corner produced in a point half hidden by a large white plate.

Female. Length, 4.6 mm., ceph. 1.5 mm., abd. 3.5 mm.

Cephalothorax brown, shaded with gray, no spots, margins dark, many long white hairs, thoracic groove very short, carapace moderately convex, but not gibbous as in typical species, anterior margin not as much narrowed as in the male; *eyes* not carried forward as far as in male, both rows recurved, a.m.e. separated by more than a diameter, lateral eyes on a common tubercle, p.m.e. larger than a.m.e. but not as large as in the male, separated by more than a diameter; *quadrangle* wider in front and as high as wide; *clypeus* equals radius of a.m.e.; *mandibles* vertical, superior margin with three teeth, middle one largest, inferior margin with three subequal teeth; *labium, maxillae* and *sternum* as in male; *abdomen* triangular, widest at base, pointed above spinnerets with a slight tubercle, dorsum dark, with a pale margin, folium impossible to see, venter pale; *legs*, I pair much the longest, femora much darker at distal end, tibiae and metatarsi with wide dark bands, spines, no ventral spines on femora, I pair, femur, prolateral, 3, retrolateral, 2 distal, dorsal, 0, patella, lateral, 2–2, tibia, prolateral, 4, retrolateral, 3, ventral, 0, dorsal, 1 at tip, metatarsus, irregular, II pair, femur, dorsal, 2 distal, prolateral, 0, retrolateral, 0, tibia, prolateral, 3, retrolateral, 2, ventral, 0, dorsal, 1 at tip, posterior femora with no trace of the retrolateral spines found on male; *epigynum* projecting forward, basal half free, tip pale and very short, usual wrinkled area very small.

Holotype ♂ Dom. Rep.; foot hills of Cordillera Central, south of Santiago, 1,000–3,000 feet, June 1938, (Darlington)

Allotype ♀ Haiti; Kenskoff, 4,500–5,500 feet, 2 September 1934, (Darlington)

Paratype ♂ Haiti; Kenskoff, 4,500–5,500 feet, 2 September 1934, (Darlington)

Paratypes 5 ♀s Haiti; Kenskoff, 3,500, feet, 3 May 1935, (Roys)

Eustala bisetosa differs in both male and female from the typical species of the genus, as the p.m.e. are larger than the a.m.e. and by a lower cephalothorax, which is not gibbous each side of the groove. The male has ventral spines on the posterior femora, a character found in a few species of the genus. However, in general features, both the palpus and the epigynum agree with the typical forms.

Eustala delasmata spec. nov.

Figure 11

Male. Length, 4.2 mm., ceph. 2.0 mm., abd. 2.5 mm.

Cephalothorax pale brown, middle area shaded with gray, four darker spots can be faintly seen near posterior end and a pair anterior to the thoracic groove, thoracic groove deep and long; *eyes*, anterior row recurved, a.m.e. largest of the eight, separated by more than a diameter, lateral eyes on a tubercle, subequal, separated by a diameter, p.m.e. separated by a diameter; *quadrangle* wider in front, and as high as wide; *clypeus* less than a radius of a.m.e.; *mandibles* small and vertical; *sternum* gray about margins, with a wide median pale stripe; *abdomen* oval, a dark folium with wavy margins, does not reach base and connects with a short median dark stripe that extends to base, venter dark with a median pale spot; *legs*, I pair longest, I coxa with hook, anterior femora dark, posterior femora banded, spines, I pair, femur, prolateral, 4, basal spine quite short, dorsal, 3, retrolateral, 2 distal, patella, lateral, 2–2, tibia and metatarsus with many unpaired spines; II pair, femur, prolateral, 2, dorsal, 3, retrolateral, 2, ventral, 2 distal, 3 median, patella, lateral, 2–2, tibia, not incrassate, prolateral, 4, dorsal, 2 very long, retrolateral, 3 very small, ventral, distal, 2, metatarsus, with median and basal whorls of spines; III pair, femur, prolateral, 4, dorsal, 3, retrolateral, 3, ventral, 2; IV pair, femur, prolateral, 3 near base, dorsal, 3, retrolateral, 5, all femoral spines on IV pair from a raised base; *palpus*, patella with one long bristle, palpal organ similar to *E. anastera* with the conductor very much shorter and smaller and the embolus longer, with clavis smaller and more slender.

Holotype ♂ Dom. Rep.; San Jose de las Matas, 1,500+ feet, June 1939, (Darlington)

Paratypes 2 ♂ Dom. Rep.; San Jose de las Matas, 1,500+ feet, June 1938, (Darlington)

Paratype ♂ Dom. Rep.; Sanchez, July 1938, (Darlington)

Eustala fusco-vittata (Keyserling)

Epeira fusco-vittata Keyserling, 1864, p. 129, pl .6, figs. 7, 8. "♀ N. Granada, St. Fé de Bogota."

♀ Haiti; hills near Port-au-Prince, 2,000 feet, October 1934, (Darlington)

♀ Haiti; foot hills north-east of la Hotte, 3,000–4,000 feet, 3 October 1934, (Darlington)
♂ ♀ Haiti; Diquini, November 1912, (Mann)
♀ Dom. Rep.; Puerto Plata, August 1941, (Hurst)

Eustala perdita spec. nov.

Figures 4, 9

Male. Length, 3.0 mm., ceph. 2.0 mm., abd. 2.0 mm.

Cephalothorax greenish-yellow, darker about eyes, with a transverse row of two pairs of small dark spots at groove and a widely separated pair of larger dots about the middle, anterior margin much narrowed, thoracic groove faint; *eyes* cover anterior margin, anterior row strongly recurved, a.m.e. largest of the eight, convex, separated by a diameter and carried forward, a.l.e. less than a radius of a.m.e. and separated from them by a diameter of a.l.e., posterior row straight, p.m.e. little more than a radius of a.m.e., separated by a radius, lateral eyes touching and subequal; *quadrangle* longer than wide and much narrowed behind; *clypeus* below a.m.e. about a radius of a.m.e.; *mandibles* vertical, weak, boss, small and distinct, fang groove short, horizontal, superior margin with three small teeth, inferior margin with two teeth; *labium* dark, wider than long, tip rebordered; *maxillae* more than twice as long as labium; *sternum* triangular, as wide as long, IV coxa separated by half a diameter; *abdomen* oval, widest at base which extends over cephalothorax, generally dark with a pair of transverse pale spots at base, and an undulate pale stripe each side on posterior half that marks an indistinct folium, venter pale, shaded with dark gray; *legs*, 1–2–4–3, I right missing, basal half of femora pale, tibiae and metatarsi with dark bands about middle, wider on anterior pairs, ventral side of femora spotted, I coxa with a small hook, II pair with no specialized spines, I pair, femur, dorsal, 2 small on basal half, prolateral, 3 about middle, ventral, 3? median, most of spines broken off and those remaining very short, patella, 0, tibia, dorsal, 0, prolateral, 3, retrolateral, broken, metatarsus, 0; II pair, not modified, femur, dorsal, 2 on basal half, ventral, median row of 3, prolateral, 0, retrolateral, 1, patella, 0, tibia, dorsal, 3, prolateral, 3, retrolateral, 3; III pair, femur, ventral, 2 median basal, IV femur, 2 median about middle; *palpus*, shorter than cephalothorax, patella and tibia of equal length, tibia with a ventral wing-like projection the entire length of the joint, paracymbium small, embolus slender

and almost straight, half hidden beneath a semi-transparent cap at tip, unca dark with a broad obtuse tip, clavis long with distal third narrowed.

Female. Length, 5.0 mm., ceph. 2.1 mm., abd. 3.0 mm. long, 3.0 mm. wide.

Cephalothorax like male, but darker about eyes, not much swollen each side of groove but with the same dark spots; *eyes*, a.m.e. not as large as in male, and not carried forward, p.m.e. separated by almost a diameter; *quadrangle* and *clypeus* same as in male; *abdomen* oval, widest at base, dark brown with many minute spots, no pair of transverse spots as in male and lateral pale margins of folium very indistinct, venter pale with a faint median dark spot; *legs* 1–2–4–3, slender, same as in male but dark rings wider and more distinct and dark spots on femora more conspicuous, no ventral spines on femora, spines, I pair, femur, dorsal, 2 small, prolateral, 3, tibia, prolateral, 3, retrolateral, 3, ventral, 0, patella, 0, tibia, dorsal, 0, prolateral, 2, retrolateral, 2, ventral, 2–2; *epigynum*, a convex chitinized plate, wider than long, darker about margins with a short, narrow finger at anterior end directed forward.

Holotype ♂ Haiti; Port-au-Prince, July 1941, (Audant)

Allotype ♀ Haiti; Port-au-Prince, July 1941, (Audant)

Paratypes ♀ Haiti; Port-au-Prince, July 1941, (Audant)

Paratype ♀ Haiti; Kenskoff, 5,000–7,000 feet, September 1934, (Darlington)

The generic position of this species is confusing. The palpus of the male is very similar to the typical forms of *Eustala* but the specialized spines of the second leg are missing, the vulva is totally unlike that of any in the genus but is similar to some of the Central American species that have been placed in the genus *Aranea*. The male and female are alike in having the same distinctive pattern on both cephalothorax and abdomen.

Eustala vegeta (Keyserling)

Figure 7

Epeira vegeta Keyserling, 1865, p. 819, pl. 19, figs. 31–34. "♂ ♀ N. Granada, Keyserling Coll."

♀ s Haiti; Diquini, November 1912, (Mann)

♂ Haiti; Port-au-Prince, July 1941, (Audant)

♂ ♀ Dom. Rep.; Puerto Plata, April–August 1941, (Hurst)

Genus Mangora O.P.–Cambridge 1889

Mangora striatipes spec. nov.

Figures 17, 18

Male. Length, 2.0 mm., ceph. 1.0 mm., abd. 1.1 mm.

Cephalothorax pale, anterior margin much narrowed, two-thirds as wide as long, thoracic groove very long and deep, covered by a black line, thoracic portion much higher than cephalic, highest near end of groove; *eyes* cover anterior margin, anterior row strongly recurved, a.m.e. largest of the eight, separated by a diameter and from a.l.e. by a little more, posterior row straight, p.m.e. heavily ringed with black so they appear larger than a.m.e., separated by about half a radius, lateral eyes touching; *quadrangle* wider in front and higher than wide; *clypeus* less than a radius of a.m.e., retreating; *mandibles* vertical, small, weak, no boss; *labium* as wide as long, tip narrower than base; *maxillae* twice as long as labium; *sternum* pale, margins with a narrow black line, triangular, little longer than broad, tip carried between IV coxae in a lobe; *abdomen* oval, narrow base extends over cephalothorax, dull gray, covered with irregular pale blotches and black dots, one small median black dot at base, followed by a pair that are widely separated, on posterior half, two parallel rows of five black spots with area between a dull gray, venter a dull yellow with an irregular dark stripe each side; *legs*, 4–1–2–3, pale, anterior pairs with a black ventral line on femora ending in a dot, spines long, black, fragile, I coxae with a large hook, I femur with 2 long prolateral spines from a raised base, II tibia with 3 heavy, short ventral spines near base, with a longer retrolateral basal spine and a heavy retrolateral spine about the middle, III tibia with 2 prolateral diagonal rows of plumose cilia near base, each row of 5 slender cilia from a raised base, often the cilia are broken but the scar can be easily seen, no ventral trichobothria on posterior femora; *palpus* shorter than cephalothorax, patella and tibia of equal length, patella with one long bristle at tip, embolus long and ending with an abrupt turn, free portion half covered with a semi-transparent leaf-like lobe, clavis at base with two short black points, much smaller than *Mangora mobilis* O.P.–Cambridge, from Central America.

Female. Length, 3.0 mm., ceph. 1.7 mm., abd. 2.7 mm.

Cephalothorax and *eyes* as in male, but the black rings about p.m.e. much wider, so that eyes appear larger than a.m.e.; *mouth parts* same as in male; *sternum* dark with a pale spot below labium; *abdomen* as in male but base much narrower and black spots on posterior half

fused into two black lines, venter with a median dark spot and smaller dark spots each side; *legs*, 4–1–2–3, pale, spines from a black base, so that legs appear spotted, anterior femora with a ventral black line with a basal dot as in male, no short ventral spines on II tibia, III tibia with two parallel diagonal rows of cilia as in male, a long median ventral trichobothria on IV femur near base and several scars that may be from trichobothria, IV tibia, prolateral, 2 cilia very near base, IV patella, a long, retrolateral spine, tibia with a very long median basal spine; *epigynum*, a pale narrow median scape with a recurved tip protruding from the plane of the venter, as in *Mangora placida* (Hentz), each side a clear oval space.

Holotype ♂ Haiti; Diquini, November 1912, (Mann)

Allotype ♀ Dom. Rep.; Puerto Plata, May 1941, (Hurst)

Paratype 2 ♂ Haiti; Diquini, November 1912, (Mann)

Paratypes 6 ♀ Haiti; hills near Port-au-Prince, 2,000 feet, 2 October 1934, (Darlington)

Paratypes 2 ♀ Haiti; Kenskoff, 4,300 feet, 1 May 1935, (Roys)

Paratypes ♀ s Dom. Rep.; Puerto Plata, July 1941, (Hurst)

Mangora striatipes probably belongs to Simon's second group of the genus with *M. fornicata* (Keys.) as the type, although the a.m.e. are larger than the p.m.e. It must be a common spider on the island from the number of specimens collected. The males have no ventral trichobothria on the posterior femora, but the females have one long one and several scars. It is difficult to count or describe the spines, for in most cases, they have been broken and only the scars remain. The spines are black, long and slender. In the female the median dorsal basal spine on the fourth tibia is very conspicuous.

Mangora picta O.P.–Cambridge, the genotype, has three short ventral spines at the base of the II tibia. In neither volume of the Biol. Centr. Amer., is the number or arrangement of the cilia on the third tibia noted. This character, while apparently trivial, evidently is constant in both male and female of a species. Chamberlin and Ivie, in the descriptions of three new species from Panama, also fail to mention the cilia.

Genus Marxia McCook 1895

Marxia stellata (Walckenaer)

Epeira stellata Walckenaer, 1805, p. 65, fig. 54. "Bosc, manuscrit sur les araignées de la Caroline, pl. 1, fig. 1."

♂ ♀ *pullus* Haiti; Trou Caiman, 4 September 1934, (Bates)

Genus Metazygia F.O.P.-Cambridge 1904

Metazygia manni spec. nov.

Figures 12, 13, 23

Male. Length, 5.6 mm., ceph. 3.0 mm., abd. 3.4 mm. long, 2.5 mm. wide.

Cephalothorax chestnut-brown, smooth and shining, rather flat, cephalic portion higher, anterior margin not much narrowed, thoracic groove deep, a long slender bristle posterior to lateral eyes and a long bristle between p.m.e. and p.l.e., median row of small bristles from groove to posterior eyes; *eyes* cover anterior margin, anterior row recurved, a.m.e. largest of the eight, carried forward, separated by less than a diameter, a.l.e. little over a radius of a.m.e., posterior row slightly recurved, lateral eyes touching and subequal, p.m.e. slightly larger than p.l.e., almost touching; *quadrangle* wider in front than behind, and wider than high; *clypeus* retreating, less than a diameter of a.m.e.; *mandibles* dark brown, vertical, long, boss small, median margin on distal half deeply excavate, with a broad flat lobe ending in an incurved hook above the fang groove, fang groove horizontal, fang with a very thick base, distal half of fang short, compressed and sinuous; *labium* wider than long, tip rounded and rebordered, sides parallel; *maxillae* twice as long as labium; *sternum* three-fifths as wide as long, emarginate, pointed between IV coxae, I coxae with a small hook, and a basal lobe, IV coxae swollen; *abdomen* elliptical, dorsum slightly convex, with numerous short hairs and long bristles, pale brown, folium outlined by black emarginate stripes, each section with a small dark spot, venter pale; *legs*, 1–2–4–3, pale brown, tibiae darker, spines, I pair, femur, ventral, 0, dorsal, 4, prolateral, 2, slender, retrolateral, 2, patella, slender bristle at tip, prolateral, 2, retrolateral, 1, tibia, dorsal, 1, prolateral, 2, retrolateral, 2, ventral, 2–2–2–2, metatarsus, prolateral, 2, retrolateral, 2, ventral, 2–2, II pair, femur, dorsal, 4, prolateral, 2, retrolateral, 2, ventral, 0, patella, slender spine at tip, tibia, dorsal, 1, prolateral, 2, large and heavy, retrolateral, 2, ventral, 2–2–2–2–2, basal pair small, 2p and 3p above base large and heavy, metatarsus, dorsal, 2, prolateral, 2, retrolateral, 2, III pair, femur, ventral, 2 small stout spines, widely separated, patella, slender spine at tip, lateral, 1–1, IV pair, femur, ventral, oblique row of 3 short stout spines at tip, followed by a short space and a row of 6 spines ending at base, patella, slender bristle at tip, lateral, 1–1; *palpus* large, shorter than cephalothorax, patella little

longer than wide, 1 bristle at tip, tibia shorter than patella with a large ventral lobe, equal in size to joint, with many long bristles, paracymbium small and dark, clavis the most prominent piece, sides almost parallel, protrudes with tip recurved, embolus a slender straight tube with tip resting against clavis.

Female. Length, 8.5 mm., ceph. 3.5 mm., abd. 6.1 mm.

Cephalothorax bright brown, cephalic portion much darker, anterior margin little narrowed, thoracic groove a deep pit rather than a groove, no bristles posterior to lateral eyes as in male; *eyes* as in male; *mandibles* mahogany brown, geniculate, boss distinct, median margin not excavate, superior margin of fang groove with two large teeth, inferior margin with two small teeth; *labium, maxillae* and *sternum* as in male; *abdomen* elliptical, dorsum slightly convex, yellowish-gray, with folium outlined with quite wide emarginate black stripes, from base to near spinnerets, each section with a dark spot, venter dull brown; *legs*, 1–2–4–3, brown, anterior patellae spines as in male, no ventral spines on femora as in male; *epigynum*, a heavily chitinized plate, wider than long, with a small anterior turned scape, each side depressed ovals that probably are the openings.

Holotype ♂ Haiti: Cap Haitien, January 1913, (Mann)

Allotype ♀ Haiti; Cap Haitien, January 1913, (Mann)

Paratypes 4 ♀ Haiti; Cap Haitien, January 1913, (Mann)

The generic position of this species is very uncertain. The male agrees with *Parawixia* in the general structure of the palpus and the row of ventral spines on all femora. The female however, has the elliptical abdomen without tubercles and a folium and epigynum very similar to *Metazygia wittfeldae* (McCook), the genotype. Male and female undoubtedly belong together as they were collected at the same time and have the same abdominal markings. Typical forms of both *Metazygia* and *Parawixia* have the second tibia of the male modified. *M. manni* however, has no specialized spines on that joint. The mandibles of the male are modified, which is quite characteristic of Hispaniola species.

Genus Metepeira F.O.P.–Cambridge 1903

Metepeira inerma spec. nov.

Figure 20

Female. Length, 4.1 mm., ceph. 1.6 mm., abd. 2.6 mm. long, 2.1 mm. wide.

Cephalothorax yellowish-brown, paler about eyes and on posterior portion, anterior margin about half the greatest width, head little raised, no thoracic groove; *eyes* cover anterior margin, anterior row recurved, eyes equidistant, a.m.e. separated by fully a diameter and a half, posterior row very slightly recurved, p.m.e. smaller than a.m.e., separated by a diameter, lateral eyes touching and subequal; *quadrangle* narrower behind than in front and wider than high; *clypeus* equals more than a radius of a.m.e.; *mandibles* vertical, pale brown, boss very small, fang groove with three teeth on each margin; *labium* wider than long, tip rebordered and pointed; *maxillae* twice as long as labium; *sternum* brown, almost as wide as long, (2.5 : 3.0), sides emarginate; *abdomen* rather faded, basal half with a pair of transverse pale spots near middle, posterior half with a pair of converging scalloped dark lines with area between dark, entire abdomen in life probably covered with long dark hairs from pits, as many remain on sides, venter with a wide dark stripe from pedicel to spinnerets with a central pale spot, each side of spinnerets a small pale spot; *legs*, 1–2–4–3, pale, with tips of joints darker, I pair quite long, metatarsus plus tarsus equals tibia plus patella, spines few and weak, all patellae with a long distal and basal spines, III and IV tibiae with long dorsal basal spines, I pair, femur, ventral, 0, dorsal, 0, prolateral, 1, retrolateral, 0, tibia, dorsal, 2, distal and basal, prolateral, 1, retrolateral, 1, prolateral and retrolateral rows of very long bristles, ventral, 0, metatarsus, ventral, 1, basal; *epigynum* small for the size of the spider, median scape colorless, slender with a recurved tip, each side are chitinized lobes.

Holotype ♀ Haiti; Cap Haitien, March 1934, (Utawana Expedition)

Paratypes 3 ♀s Haiti; Cap Haitien, March 1934, (Utawana Expedition)

Metepeira inerma belongs to the group of which *labyrinthea* (Hentz) is the most widely distributed and best known. It is separated from that species by the smaller size, fewer spines on the legs and by the epigynum, where the scape is almost colorless, slender and rather short and the openings are widely separated. It does not agree fully with the original definition of the genus by F.O.P.-Cambridge, as the lateral eyes are almost touching, and the first tibia plus the patella equals the first metatarsus plus the tarsus.

Genus Neoscona Simon 1864

Neoscona oaxacensis (Keyserling)

Epeira oaxacensis Keyserling, 1864, p. 121, pl. 5, figs. 12–16. "♀ Oaxaca, (Mexico)"

Epeira theisii Banks, 1903, nec Walckenaer, 1837

♀ Haiti; hills near Port-au-Prince, 2,000 feet, 2 October 1934, (Darlington)

♂ ♀s Haiti; Kenskoff, 4,200 feet, 2 May 1935, (Roys)

Neoscona vulgaris (Hentz)

Epeira vulgaris Hentz, 1847, p. 469, pl. 30, fig. 6; reprint, p. 108, pl. 12, fig. 6. "♀ South Carolina"

Epeira volucripes Keyserling, 1884, p. 528, pl. 13, fig. 27. "♀ Central America, Panama and Hayti, Universität Cambridge."

nec *Epeira nautica* Simon, 1897, Petrunkevitch, 1930, Gertsch.

The synonymy of this species has been confused for many years. Emerton thought he recognized this species as a northern spider and added several northern localities as foot notes in the reprint of Hentz Spiders of the United States, 1875, and in 1884, he placed *E. vulgaris* as a synonym of the European spider *sclopetaria* of Clerck. The two species belong to different sections of the genus but the error has been continued for many years. Banks recognized the Hentz species and in 1900, placed *volucripes* of Keyserling as a synonym in a short paper on Alabama spiders but this synonymy has been overlooked by later workers.

In 1897, Simon identified *Epeira nautica* L. Koch in a collection of spiders from St. Vincent. *Epeira nautica* was described by Koch in 1875 from Egypt and Syria. In the Museum collection are two females from Arabia, received from the Paris Museum. Both are pale and are much larger than any specimens of *volucripes* or *vulgaris* in the collection and while size and color are uncertain characters to use, the epigynum show decided differences. The scape of *nautica* is much longer in proportion to the width and when turned back, as so often is the case, the darkened areas are connected and the depressed spots are not the same.

Males of *vulgaris* and *volucripes* (type material of the latter), have been carefully compared, the palpi are identical in every part, but the number of short stout spines on the second tibia varies. In a

specimen from Santiago de las Vegas, Cuba, there is a row of ten short black spines; in the type of *volucripes* from Haiti, there are but five or six spines; in a specimen from Shreveport, Louisiana, there are five spines irregularly placed. This difference may be only individual, but it is hardly enough to separate into two species.

♂ ♀ type Haiti; *Epeira volucripes* Keys.
3 ♀ Haiti; 1858, Dr. Weinland.
2 ♀ Haiti; Cap Haitien, March 1934, (Utowana Expedition)
♀ Haiti; Cap Haitien, January 1913, (Mann)
♀ Haiti; Dame-Marie, 1941, (Audant)

Genus Neosconella F.O.P.–Cambridge 1904

Neosconella parva spec. nov.

Figures 19, 24

Female. Length, 3.8 mm., ceph. 1.7 mm., abd. 2.6 mm. long, 2.1 mm. wide.

Cephalothorax dull yellow, lateral margins and cervical grooves darker, cephalic portion not elevated behind posterior row of eyes, no thoracic groove; *eyes* cover anterior margin, anterior row of eyes recurved, eyes small and subequal, a.m.e. separated by more than a diameter with a pair of bristles between, posterior row straight, p.m.e. largest of the eight, surrounded by wide dark rings that touch, lateral eyes touching, p.l.e. slightly larger than a.l.e.; *quadrangle* much narrower behind than in front and as high as wide in front; *clypeus* less than a diameter of a.m.e.; *mandibles* yellow, vertical, boss small, fang groove horizontal, superior margin of groove with three teeth, inferior margin with three smaller teeth; *labium* brown, wider than long, tip rebordered; *maxillae* brown, more than twice as long as labium, sides parallel; *sternum* brown, three-quarters as wide as long, convex, pointed in front of IV coxae; *abdomen* oval, no shoulder tubercles, basal half high, a pale diamond on basal half with heavy brown marks each side, on sides irregular dark spots, venter with a broad dark stripe from groove to spinnerets with a pale spot in center; *legs* relatively short, yellow, with no darker markings, varying little in length, but anterior pairs longer, very few spines, femora with no ventral spines, anterior tibiae with very few ventral spines, posterior tibiae with a very slender dorsal basal spine; *epigynum* large for the size of the spider and protruding from the venter, median scape short, broad,

with median area depressed, each side of scape are large openings with heavily chitinized margins.

Holotype ♀ Dom. Rep.; foot hills of Cordillera Central, south of Santiago, 2,000–5,000 feet, June 1938, (Darlington)

Paratypes ♀ Dom. Rep.; Loma Rucilla Mountains, north of Cordillera Central, 5,000–8,000 feet, June 1938, (Darlington)

Neosconella parva does not agree in all points with the description of the genus given by F.O.P.–Cambridge in the Biol. Centr. Amer., 1904, 2, p. 474. The p.m.e. are the largest of the eight and the posterior row of eyes is straight, rather than recurved. Also, there are three teeth on the upper margin of the fang groove instead of four. However, the spines on the legs are very few, the legs vary little in length, and the epigynum is of the same type.

Genus Parawixia F.O.P.–Cambridge 1904

Parawixia cambridgei Bryant

Parawixia cambridgei Bryant, 1940, p. 342, figs. 104–106. "♂ ♀ Cuba; Oriente, coast below Pico Turquino, June 1936"

♀ Haiti; Diquini, November 1912, (Mann)

Parawixia darlingtoni spec. nov.

Figures 14, 16, 21

Male. Length, 4.1 mm., ceph. 2.1 mm., long, 1.9 mm. wide, abd. 2.5 mm. long, 2.0 mm. wide.

Cephalothorax low and flat, cephalic portion a bright yellow triangle to groove, remainder a chestnut-brown, both cephalic and thoracic portions with many fine white hairs, a crest of white hairs posterior to lateral eyes, anterior margin half the greatest width, thoracic groove long and distinct; *eyes* cover anterior margin, anterior row strongly recurved, a.m.e. largest of the eight, on a small lobe that is carried forward, eyes separated by less than a diameter, posterior row not as strongly recurved, p.m.e. little more than a radius of a.m.e. and separated by more than a diameter, lateral eyes touching and on a distinct tubercle, subequal, smaller than p.m.e., a.l.e. and p.m.e. form a straight line; *quadrangle* wider in front than behind and wider than high; *clypeus* below a.m.e. less than a diameter of a.m.e.; *mandibles* dark brown, vertical, basal half granular, fang groove horizontal, and fang

short; *labium* wider than long, tip rebordered; *maxillae* twice as long as labium; *sternum* triangular, not quite as wide as long, pale, shaded with gray about margins, pointed in front of IV coxae, I coxae with a small hook and a large basal lobe, IV coxae with a strong, dark spur, IV trochanter with a dark spine; *abdomen* pale, with no folium, almost as wide as long, (7:8), a pair of small tubercles between shoulder angles and not on lateral margins, basal third with many short bristles directed upward, each from a dark base, venter gray with a pair of conspicuous white spots anterior to spinnerets; *legs*, 1–2–4–3, rather short, not differing greatly in length, pale with a wide dark band on femora, distal and median bands on tibiae and metatarsi, spines, I pair, femur, dorsal, 4 small spines in a median row, prolateral, 4, second from distal end very long, retrolateral, 3, all small spines, ventral, a retrolateral row of 6 short spines on distal half, a slender prolateral spine opposite the retrolateral row, patella, dorsal, a slender spine at tip, a small spine at base, prolateral, 2, retrolateral, 1, tibia, dorsal, a small spine near base and a long spine near tip, prolateral, 3 long spines on distal half, retrolateral, 2, ventral, a prolateral row of 5 long spines, retrolateral, 0, metatarsus, 0, II pair, slightly larger than I pair, femur, dorsal, median row of 3 small spines, prolateral, 2, retrolateral, 2, ventral, a strong median basal spine longer than the diameter of the joint from a raised base, a retrolateral row on distal half of 6 short, strong spines, patella, same as I pair, except that the basal spine is missing, tibia, dorsal, median row of 3 slender spines, prolateral, 5, retrolateral, 0, ventral, a prolateral row of 4 graduated spines more than diameter of joint, a retrolateral row of 3 on basal third, all from a raised base, basal spine almost twice the diameter of the joint, metatarsus, sinuous, with 1 dorsal median spine about middle, III pair, femur, ventral, 0, patella, dorsal, 1 slender spine at tip, lateral, 1–1, IV pair, femur, dorsal, median row of 3 slender spines, ventral, a retrolateral row of 8 graduated spines, 2 distal longest, patella, dorsal, 1 slender spine at tip, 1 near base, lateral, 1–1, tibia, dorsal, 1 median spine at base, ventral, 3 median; *palpus*, shorter than cephalothorax, patella as long as wide, with 1 long bristle at tip, paracymbium large and dark, tip widened and turned back, but not divided, clavis very large, tip ending in two points.

Female. Length, 4.1 mm., ceph. 1.9 mm., abd. 3.0 mm. long, 3.0 mm. wide.

Cephalothorax chestnut-brown, longer than wide, cephalic portion with many silvery hairs, slightly convex, anterior margin narrowed, no thoracic groove; *eyes* cover anterior portion of head, median eyes

carried forward, anterior row recurved, a.m.e. only slightly larger than a.l.e., separated by little more than a diameter, lateral eyes on a low tubercle and touching, posterior row recurved, p.m.e. little larger than a.m.e., separated by fully a diameter; *quadrangle* only slightly wider in front and as high as wide; *clypeus* below a.m.e. equals a diameter of a.m.e.; *mandibles*, small, brown, vertical, superior margin of fang groove with three teeth, inferior margin with two teeth; *sternum* brown, little longer than wide, pointed in front of IV coxae, IV coxae touching; *abdomen* as wide as long, widest near base, a pair of widely separated small tubercles between shoulder angles, slightly larger than in male, a pair of dark basal spots extending to tubercles and vague paired dark marks on posterior two-thirds, that suggest a folium, on a cream color ground, many dark bristles, venter dark with a pair of cream-colored spots anterior to spinnerets; *legs*, 1–2–4–3, rather short, dark brown, tibiae with median pale band, very few spines, femora, 0, anterior patellae, dorsal, 1 long spine at tip, 1 short spine at base, prolateral, 2, retrolateral, 1; *epigynum* rather small, area wider than long, a slender wrinkled white scape at anterior end, with tip much narrowed and abruptly turned out, best seen in a lateral view, above the fold are two widely separated black spots and slightly above them, smaller circles that are probably the openings.

Holotype ♂ Dom. Rep.; Villa Altagracia, July 1938, (Darlington)

Allotype ♀ Haiti; La Visite, 6,000–7,000 feet, 16–23 September 1934, (Darlington)

The male and female of this species were not found together, but they have similar markings and are about the same size. They are the only species seen from the island with tubercles between the shoulder angles. The genus was erected for Central American species, all much larger than *darlingtoni*, with small tubercles at the tip of the abdomen. The presence or absence of spines on the posterior trochanters is a variable character in the genus. The arrangement of spines on the second tibia of the male is very similar to that found in *Wixia*.

Genus Verrucosa McCook 1888

Verrucosa arenata (Walckenaer)

Epeira arenata Walckenaer, 1837, 2, p. 133. "♂ ♀ La Georgie"

♀ Haiti; Grande Riviere, January 1913, (Mann)

♀ Dom. Rep.; Puerto Plata, 30 August 1938, (Darlington)

Genus Wagneriana F.O.P.–Cambridge 1904

Wagneriana tauricornis (O.P.–Cambridge)

Epeira tauricornis O.P.–Cambridge, 1889, p. 44, pl. 6, figs. 2, 3. "♂ ♀ Guatemala ——— Panama"

♀ Haiti; Port-au-Prince, (Crew), Banks Coll.
♀ Haiti; Port-au-Prince, July 1941, (Audant)
♂ Haiti; hills near Port-au-Prince, 2,000 feet, 2 October 1934, (Darlington)

Subfamily METINAE

Key to Genera

1. Fourth femur with a prolateral row of curved cilia 2
   Fourth femur with no prolateral row of cilia 4
2. Curved cilia on basal half of femur, abdomen with posterior truncate tubercle ..... *Alcimosphenus*
   Curved cilia on entire length of femur, abdomen with no posterior tubercle 3
3. First tibia and metatarsus with rows of triangular cuspules .... *Plesiometa*
   First tibia and metatarsus with no rows of cuspules ..... *Leucauge*
4. Lateral eyes widely separated on separate tubercles ..... *Azilia*
   Lateral eyes touching on a common tubercle 5
5. Mandibles with group of black nodules on inner margin ..... *Metargyra*
   No black nodules on mandibles 6
6. Third femur with one or two rows of long straight colorless trichobothria (both ♂ and ♀), paracymbium of male palpus much divided ..... *Pseudometa*
   Third femur with no rows of colorless trichobothria 7
7. P.M.E. larger than A.M.E. ..... *Meta* (?)
   A.M.E. larger than P.M.E. ..... *Meta* (?)

Genus Alcimosphenus Simon 1895

Alcimosphenus licinus Simon

Alcimosphenus licinus Simon, 1895, p. 930. "♀ Jamaica, S. Domingo."

Simon based this genus on females of this species from Jamaica and San Domingo. It probably is found on all of the islands of the West Indies, but as far as known, it has never been reported from either Central or South America. The male is still unknown. Because of the rows of curved cilia on the fourth femur, it should be placed with *Leucauge* in the *Metinae*.

♀ Haiti; Trouin, 26 June 1934, (Loomis)
♀s Dom. Rep.; Puerto Plata, July–August 1941, (Hurst)

Genus Azilia Keyserling 1881

Azilia sp.

♀ pullus Haiti; La Visite, 6,000–7,000 feet, 16–23 September 1934, (Darlington)

This specimen is probably one moult from maturity and it may be *Azilia montana* Bryant, known only from the holotype, a female found on the south side of Pico Turquino, Cuba, at an elevation of from 3,000–5,000 feet.

Genus Leucauge White 1841

Leucauge regnyi (Simon)

Argyroepeira regnyi Simon, 1897, p. 871. "♂ ♀ St. Vincent"
Meta bigibbosa Banks, 1903, p. 341 *nec* Keyserling, 1863

♀ Haiti; Grande Riviere, January 1913, (Mann)
♀ Haiti; Kenskoff, 4,500–5,500 feet, 2 September 1934, (Darlington)
♀ Haiti; Trou Caiman, 4 September 1934, (Bates)
♀ Haiti; hills near Port-au-Prince, 2,000 feet, October 1934, (Darlington)
♂ ♀ Haiti; Kenskoff, 4,300 feet, May 1935, (Roys)
♂ ♀ Dom. Rep.; Puerto Plata, April–May 1941, (Hurst)

Genus Meta C. Koch 1836

Meta (?) blanda spec. nov.

Figure 22

Female. Length, 2.6 mm., ceph. 1.0 mm., abd. 1.5 mm.

Cephalothorax pale, with a wide dark line above coxae, moderately convex, anterior margin narrowed, no thoracic groove, a long bristle posterior to lateral eyes; *eyes* cover anterior margin, anterior row recurved, eyes equidistant, a.m.e. slightly larger than a.l.e., posterior row only slightly recurved, lateral eyes touching on a common tubercle, p.m.e. heavily ringed with black, separated by about a radius and from p.l.e. by more than two diameters, p.m.e. slightly larger than

a.m.e.; *quadrangle* narrower behind and higher than wide; *clypeus* less than a diameter of a.m.e.; *mandibles* pale, vertical, no boss, fang groove oblique, superior margin with three small teeth; *labium* wider than long, tip rebordered; *maxillae* more than twice as long as labium, margins parallel; *sternum* brown, slightly convex, triangular, almost as wide as long, ending in a blunt point in front of IV coxae; *abdomen* oval, white with an indistinct folium on basal third, and a heavier dark folium on distal third, venter dark with an irregular white spot in middle and curved white lines each side, that do not reach spinnerets; *legs*, 1–2–4–3, pale with a few hairs and not many true spines, all patellae with a long apical spine, spines I pair, femur, 1 prolateral about middle, patella, 1 dorsal near base, 1 apical, tibia, dorsal, 2, prolateral, 2, retrolateral, 1, ventral, 0, metatarsus, no true spines but a prolateral row of stiff bristles; *epigynum*, area wider than long, a very broad short median scape that protrudes outward, openings on extreme lateral margins, large, surrounded by a wide heavily chitinized ring, dark tubes below the skin lead to small black dots below tip of scape.

Holotype ♀ Haiti; Kenskoff, 4,300 feet, 1 May 1935, (Roys)

Paratypes ♀s Dom. Rep.; Loma Rucilla Mountains, Cordillera Central, 5,000–8,000 feet, June 1938, (Darlington)

Meta (?) *blanda* is congeneric with *Meta adjuntaensis* Petrunkevitch, from Puerto Rico, also described from a female. Dr. Petrunkevitch describes another species of *Meta* from Puerto Rico in the same paper and states that they do not conform strictly to the type of the genus.

The genus *Meta* is based on *menardi*, a common species of Europe and North America. It is large, with an oval abdomen, rounded and very high at the base, quite unlike the species reported here. In 1899, O.P.-Cambridge erected the genus *Metabus* for the female *gravidus* found in Guatemala. The diagnosis differs little from *Meta* and F.O.P.-Cambridge in 1903, (Biol. Centr. Amer., 2 : 446) places *Metabus gravidus* in the genus *Meta* but states that it is possible that with material of both sexes, the genus *Metabus* could be separated from *Meta*. It is not impossible, that *blanda* and *adjuntaensis* Petr. belong to this genus, for they certainly are not congeneric with *Meta*.

Meta (?) hotteiensis spec. nov.

Figure 25

Female. Length, 4.0 mm., ceph. 1.5 mm., abd. 3.0 mm. long, 2.2 mm. wide.

Cephalothorax pale yellow, slightly darker in eye area, with a few long bristles on cephalic portion, anterior margin less than half the greatest width, cephalic portion not high, and not separated from thoracic, thoracic groove a small round depression; *eyes* cover entire anterior margin, anterior row strongly recurved, a.m.e. largest of the eight, separated by a diameter and from a.l.e. by less, a.l.e. little more than a radius of a.m.e., posterior row almost straight, lateral eyes touching and subequal, p.m.e. more than a radius of a.m.e. and separated by a radius; *quadrangle* wider in front and higher than wide; a long bristle between a.m.e.; *clypeus* below a.m.e. about a radius of a.m.e.; *mandibles* pale, geniculate, vertical, no boss, superior margin of fang groove with three teeth, inferior margin with three smaller teeth; *labium* dark, wider than long, with a rebordered tip; *maxillae*, margins dark, twice as long as labium; *sternum* pale, with a few hairs about margins, sides almost parallel, pointed in front of IV coxae; *abdomen* oval, grayish-brown, no pattern but scattered silvery dots, venter with a dark rectangular spot from fold to spinnerets, pale each side; *legs*, 1–2–4–3, anterior femora dark, posterior femora pale with dark ring at tip, tibiae with broad middle and distal dark rings, most distinct on ventral side, spines, femora, no ventral spines, spines few and weak on tibiae, no spines on metatarsi; *epigynum*, a broad, short median scape, with lateral margins wrinkled and median area depressed, tip abruptly narrowed and turned out, best seen in a lateral view, a pair of very long divergent bristles at base of scape, on each side are broad ear-shaped openings with heavily chitinized margins; a pair of small black dots at tip of scape.

Holotype ♀ Haiti; foot hills northeast of Massif de la Hotte, 3,000–4,000 feet, October 1934, (Darlington)

This species has an epigynum that is similar to *Aranea detrimentosa* (Cambr.) from Guatemala. But in this species, the tip of the scape is rounded, the openings on each side are smaller and the pair of long bristles at the base of the scape are lacking.

Genus Metargyra F.O.P. Cambridge 1903

Metargyra maculata spec. nov.

Figure 15

Female. Length, 6.0 mm., ceph. 2.2 mm., abd. 4.0 mm., long 3.6 mm. wide.

Cephalothorax pale, cephalic portion high, covered with short hairs

and a few long bristles in the middle area anterior to the depression, no thoracic groove; *eyes* do not cover entire anterior margin, anterior row recurved, a.m.e. largest of the eight, separated by a radius, and from a.l.e. by a diameter, posterior row straight, lateral eyes touching and subequal, p.m.e. separated by less than a diameter and from p.l.e. by more than a diameter; *quadrangle* slightly wider in front and higher than wide; *clypeus* below a.m.e. less than a radius of a.m.e.; *mandibles* pale, vertical, geniculate, no boss, superior margin of fang groove with three teeth, and a row of six stiff bristles above groove, each bristle from a distinct nodule, and on inner margin of mandibles, above the groove a group of black nodules, inferior margin of groove with three teeth; *labium* wider than long, heavily rebordered; *maxillae* twice as long as labium, sides parallel; *sternum* pale, with many long bristles, convex, three-quarters as wide as long, ending in a truncate lobe in front of IV coxae; *abdomen* oval, almost as wide as long, dull gray, with small pale spots and irregular darker spots, venter gray, with a median square of pale dots with a darker triangle in the middle; *legs*, 1–2–4–3, anterior pairs very long, I femur as long as cephalothorax, legs pale, femora of first and second pairs with dark ventral dots, no specialized cilia on III and IV tibiae, spines, femora with no ventral spines, I pair, femur, prolateral, 3, retrolateral, 1 small spine near tip, dorsal, 1 small spine at base, patella, dorsal, 1 slender spine at tip, 1 smaller spine at base, lateral, 0, tibia, dorsal, 2, prolateral, 2, retrolateral, 1, ventral, 0, metatarsus, 0, but many hairs and bristles, II pair, femur, dorsal, 1 small spine at base, lateral, 1–1, patella, same as I pair, tibia, dorsal, 1 at tip, 1 at base, prolateral, 1, ventral, 0, metatarsus, 0, III pair, femur, ventral, 2 parallel rows of long bristles, posterior pairs with very few spines; *epigynum*, area wider than long, a broad median septum with ear-shaped openings each side.

Holotype ♀ Haiti; Ennery, 7 September 1934, (Darlington)

Paratype ♀ Dom. Rep.; Cordillera Central, 2,000–4,000 feet, Constanza to Jarabacoa, August 1938, (Darlington)

The generic position of this species is doubtful. In the key for genera, given by F.O.P.-Cambridge, in the Biol. Centr. Amer., 1902, 2 : 439, for the genera of Metinae, the first femur is three times as long as the carapace for the genus *Metargyra*. This character may be confined to males, but not females. The row of bristles from nodules above the margin of the fang groove is very unusual.

Genus Plesiometa F.O.P.–Cambridge 1903

Plesiometa argyra (Walckenaer)

Tetragnatha argyra Walckenaer, 1837, 2, p. 219, pl. 19, fig.1 . "♂ ♀ ——— Antilles, ——— La Guadeloupe"

Haiti; Port-au-Prince, (Crew), Banks Coll.
♀ Haiti; Diquini, November 1912, (Mann)
♀ Haiti; Grande Riviere, January 1913, (Mann)
♂ Haiti; Trou Caiman, 4 September 1934, (Bates)
♂ Dom. Rep.; Sanchez, July 1938, (Darlington)
♂ ♀ Dom. Rep.; Puerto Plata, April–August 1941, (Hurst)
♀ Haiti; Dame-Marie, 1941, (Audant)

Genus Pseudometa F.O.P.–Cambridge 1903

The genus *Pseudometa* was based on the species *flava* of O.P.–Cambridge from Tabasco, Mexico, known only from the male. Unfortunately, no specimen of this species is in the museum collection. The definition of the genus is short, and emphasis is laid on how it differs from related genera. It is separated from *Leucauge* and *Mecynometa* by the lack of curved cilia on the fourth femur and in the male by the fine silky hairs on the legs. The male palpus, however, is distinct, as the embolus and conductor are in a flat coil at the apex of the bulb, and the paracymbium is broken into several irregular apophyses. F.O.P.-Cambridge places in the genus six species, three known only from males and three from females. The figures of the epigynums of the three females are of two distinct types and there is a possibility that all are not adult.

The museum collection has males and females of *alboguttata* (O.P.–Cambr.) from Barro Colorado, C. Z., a male of *bella* Banks from Costa Rica, and the following from the West Indies, *distincta* Bryant, ♂, ♀, Cuba, *linguiformis* (Frang.) ♀, Cuba, *hamata* Bryant, ♂, ♀, Puerto Rico, and four species from Hispaniola, *cornuta* Bryant, ♂, ♀, *conspersa* Bryant, ♀, *linguiformis* (Frang.), ♀, and *obscura* Bryant, ♀.

A careful examination of the females of all these species, show on the third femur, a retrolateral row of long colorless bristles. In some species, there are but four bristles near the base, again, the row extends the length of the joint and in *linguiformis* (Frang.), there are two parallel ventral rows. In the males examined, the bristles are some-

times absent. In *coronata* spec. nov., there are retrolateral rows on the third and fourth femora, and in *hamata* Bryant, the row extends the entire length of the femur, as in the female, but *distincta* Bryant, male has no bristles. So probably these bristles have a generic value only in the female and can not be used, as are the short curved cilia found on the fourth femur of Leucauge.

Pseudometa conspersa spec. nov.

Figure 29

Female. Length, 5.0 mm., ceph. 2.1 mm., abd. 3.1 mm.

Cephalothorax pale, darker from eyes to groove, cephalic portion high, rising behind posterior eyes and falling gradually to groove, a few bristles above groove; *eyes* about cover anterior margin, anterior row recurved, a.m.e. separated by less than a diameter and from a.l.e. by more than a diameter, posterior row only slightly recurved, same length as anterior row, lateral eyes subequal on a common tubercle and separated by a line, p.m.e. largest of the eight, separated by less than a diameter and from p.l.e. by more than a diameter; *quadrangle* about square; *clypeus* less than a radius of a.m.e.; *mandibles* brown, vertical, swollen at base, boss faint, superior margin of fang groove with three teeth, one farthest from base of fang largest, above teeth a row of four short stiff bristles, inferior margin with four teeth, middle two small and subequal; *labium* brown, wider than long, tip rebordered; *maxillae* more than twice as long as labium; *sternum* triangular, pale, with a dark margin; *abdomen* oval, convex, widest at base, pale, mottled with brown, on posterior half the brown forms indistinct cross bars, venter pale, with a large dark spot in middle; *legs*, 1–2–4–3, anterior pairs much longer, covered with short hairs, pale, with brown rings most distinct on ventral side, no ventral femoral spines, spines, I pair, femur, prolateral, 1, patella, 1 at tip, tibia, dorsal, 2, basal and median, prolateral, 0, retrolateral, 2, near tip, ventral, 0, metatarsus, 0, II pair, femur, 0, patella, 1 at tip, tibia, dorsal, 2, prolateral, 1, retrolateral, 1, ventral, 0, metatarsus, 0, III pair, femur, a basal, retrolateral, row of 5 long, colorless bristles; *epigynum*, dark reddish-brown, heavily chitinized, area wider than long, a wide transverse dark plate, below a broad median septum, openings probably small depressions below upper margins of plate, in anterior portion below skin, two oval oblique spermathecae.

Holotype ♀ Haiti; La Visite, 6,000–7,000 feet, 16–23 September 1934, (Darlington).

PSEUDOMETA CORNUTA spec. nov.

Figures 26, 27, 28

Male. Length, 3.0 mm., ceph. 1.8 mm., abd. 2.0 mm.

Cephalothorax a dull yellow, cephalic portion marked off by heavy gray lines, higher than thoracic, thoracic depression deep, but of indefinite shape; *eyes* cover anterior margin, anterior row recurved, eyes subequal, a.m.e. separated by little more than a diameter and from a.l.e. by a little more, posterior row very slightly recurved, lateral eyes touching, p.m.e. little larger than a.m.e., separated by a diameter and from p.l.e. by a little more; *quadrangle* same width in front as behind, higher than wide; *clypeus* more than a radius of a.m.e.; *mandibles* vertical, long, basal portion swollen, not smooth, distinct longitudinal ridge on outer margin, no boss, inner margin on distal half with three long colorless bristles that interlace with bristles of opposite margin, fang groove slightly oblique, superior margin with three small teeth, inferior margin with two teeth; *labium* wider than long, rebordered; *maxillae* more than twice as long as labium, tips widened; *sternum* pale, triangular, as wide as long, carried between IV coxae in a broad lobe; *abdomen* oval, pale yellow with scattered white blotches, very few colorless hairs and long colorless bristles, venter pale; *legs*, 1–2–4–3, little darker than abdomen, with colorless hairs, anterior pairs very long, spines few and dark, no spines on metatarsi, III and IV femora, retrolateral basal row of long colorless bristles; *palpus* as long as cephalothorax, patella with one long bristle, tibia with an equally long bristle, base of cymbium divided into a long, straight black process and a smaller hook directed forward, a thin leaf-like apophysis about the middle, best seen in a dorsal view; the most conspicuous part of the palpus is the large smooth black process at the base with a large posterior part ending in a rather slender tip and a much smaller anterior portion, all parts are heavily chitinized; embolus a small black circle at the tip, coiled with the conductor.

Female. Length, 4.0 mm., ceph. 1.7 mm., abd. 2.5 mm.

Cephalothorax and *eyes* as in male; *mandibles* vertical, no long bristles on inner margins as in male, fang groove slightly oblique, superior margin with three teeth, inferior with two teeth; *mouth parts* and *sternum* same as in male; *abdomen* a broad oval, yellowish gray, covered with pale blotches, venter pale; *legs*, 1–2–4–3, pale, with faint narrow rings at tips and middle of tibiae and metatarsi, very few spines but many fine hairs, spines, I pair, femur, prolateral, 3, patella, 1 at tip, tibia, dorsal, 1, retrolateral, 2, ventral, 0, metatarsus, 0, II pair,

femur, 0, patella, 1 at tip, tibia, dorsal, 1, prolateral, 2, ventral, 0, metatarsus, 0, III pair, femur, a retrolateral row of colorless bristles, posterior pairs with very few spines; *epigynum*, large, area wider than long, a pale recurved tip, twice as long as wide, with very dark areas each side separated by half a diameter.

Holotype ♂ Dom. Rep.; Cordillera Central, Loma Viega, south of Constanza, 6,000 feet, August 1938, (Darlington)

Allotype ♀ Dom. Rep.; Cordillera Central, Loma Viega, south of Constanza, 6,000 feet, August 1938, (Darlington)

Paratypes ♂ ♀ Dom. Rep.; Loma Viega, 6,000 feet, August 1938, (Darlington)

Paratypes ♂ ♀ Dom. Rep.; Loma Rucilla Mountains, north of Cordillera Central, 5,000–8,000 feet, June 1938, (Darlington)

Paratypes ♂ ♀ Dom. Rep.; Cordillera Central, rain forest, north of Valle Nuevo, 6,000+ feet, August 1938, (Darlington)

The male of *Pseudometa cornuta* has an enormous hook at the base of the cymbium and a thin leaf-like process at the middle of the cymbium on the dorsal side, this is not found in the Central American species. The embolus and conductor are very small. The three pairs of bristles on the inner margin of the mandibles is unusual.

Pseudometa linguiformis (Frang.)

Figure 32

Meta linguiformis Franganillo, 1930, p. 20; 1936, p. 94, fig. 47. "♀ Cuba; Sierra Maestra".

Pseudometa linguiformis Bryant, 1940, p. 353, fig. 128.

Female. Length, 4.5 mm., ceph. 2.0 mm., abd. 3.0 mm. long, 2.6 mm. wide.

Cephalothorax pale yellow, cephalic portion high and outlined with gray, anterior margin two-thirds the greatest width, no thoracic groove; *eyes* do not cover anterior margin, anterior row recurved, a.m.e. separated by fully a diameter, slightly larger than a.l.e., posterior row very slightly recurved, p.m.e. largest of the eight, separated by slightly less than a diameter and from p.l.e. by a diameter and a half, lateral eyes contiguous and slightly raised; *quadrangle* little wider in front than behind and higher than wide; *clypeus* less than a diameter of a.m.e. and retreating; *mandibles* pale, geniculate, no boss, superior margin with three teeth, inferior margin with three smaller teeth, inner margin above fang groove with many dark granules; *labium* dark

brown, wider than long, tip rebordered; *maxillae* more than twice as long as labium, tip dark and transverse; *sternum* dark brown, triangular, convex, as wide as long, sides emarginate, ending in a truncate lobe in front of IV coxae; *abdomen* a broad oval, base high, dull brown, mottled with paler dots, a pale red median stripe on posterior half, venter with a mottled rectangle with a distinct dark spot in center, two diagonal stripes on sides; *legs* pale, with no dark rings, anterior pairs very long, spines black, spines, I pair, femur, dorsal, 0, prolateral, 3, retrolateral, 2 small near tip, ventral, 0, two rows of black dots, very few hairs, patella, dorsal, 1 at tip, tibia, dorsal, 2, basal and median, prolateral, 3, retrolateral, 3, ventral, 0, few short hairs and a few black dots, metatarsus, 0, but rows of black hairs, II pair, femur, prolateral, 2, patella, dorsal, 1 at tip, tibia, dorsal, 2, prolateral, 1, retrolateral, 1, ventral, 0, metatarsus, 0, posterior pairs, spineless except for spine at tip of patellae and dorsal basal spine on tibiae, III femur, two ventral rows of long colorless bristles; *epigynum* area wider than long, the median scape short, triangular and turned forward, with heavily chitinized margins each side, spermatheca widely separated anterior to openings, anterior to median scape are two depressions.

♀ Haiti; Kenskoff, 4,500–5,500 feet, 2 September 1934, (Darlington)

Pseudometa obscura spec. nov.

Figure 30

Female. Length, 4.3 mm., ceph. 2.0 mm., abd. 2.6 mm. long, 2.3 mm. wide.

Cephalothorax dull yellow, cephalic portion high, veined with dark gray, with the heaviest markings near posterior end, two-thirds as wide as long, anterior margin more than half the greatest width, no groove but a depression; *eyes* do not cover anterior margin, anterior row recurved, a.m.e. separated by fully a diameter and from a.l.e. by less, posterior row very slightly recurved, eyes equidistant, heavily ringed with black, p.m.e. slightly larger than a.m.e., separated by about a diameter, lateral eyes touching on a low tubercle, p.l.e. larger than a.l.e.; *quadrangle* slightly wider behind than in front and higher than wide; *clypeus* about as high as diameter of a.m.e.; *mandibles* vertical, no boss, superior margin of groove with three teeth and a parallel row of three bristles, inferior margin with three smaller teeth; *labium* pale, wider than long; *maxillae* more than twice as long as labium; *sternum* pale, longer than wide, (3.0 : 2.5); *abdomen* triangular, nearly as wide as long, dorsum flattened, dull grayish-brown, with small yellow

flecks and two widely divergent rows of dark spots on posterior half, the largest about the middle of the dorsum, venter dull brown; *legs*, 1–2–4–3, anterior pairs much longer, same color as cephalothorax, with faint dark rings at middle and tips of anterior tibiae, and tips of anterior metatarsi, very few spines, I pair, femur, prolateral, 3, from a raised base, patella, 1 small spine at tip, tibia, prolateral, 2 small, basal and distal, metatarsus, 0, III femur with a retrolateral row of long colorless bristles, posterior tibiae with dorsal basal spine; *epigynum*, chitinized area wider than long, openings large transverse, directly above fold, anterior half a confused mass of dark oval sacs beneath the surface.

Holotype ♀ Dom. Rep.; Mt. Diago de Ocampo, north range, 3,000–4,000 feet, July 1938, (Darlington)

Subfamily NEPHILINAE

Genus Nephila Leach 1815

Nephila clavipes (Linn.)

Aranea clavipes Linnaeus, 1867, p. 1034, no. 27. "♀ in America"

♀s Haiti; Diquini, November 1912, (Mann)
♀ Haiti; Grande Cayemitte Island, 1 August 1927, (Eyerdam)
♀ Haiti; Cap Haitien, March 1934, (Utawana Exped.)
♀ Dom. Rep.; Constanza, 3,000–4,000 feet, August 1938, (Darlington)
♀ Haiti; Port-au-Prince, July 1941, (Audant)

Subfamily TETRAGNATHINAE

According to some recent arachnologists, the old sub-family *Tetragnathinae* has been split into *Tetragnathinae* and *Glenognathinae* based upon the position of the opening of the posterior spiracle. Each is supposed to have a row of trichobothria on the fourth femur. Other workers following Menge, (1866), have raised the sub-family to family rank.

While only five genera of this sub-family have been seen from Hispaniola, it is sufficiently evident that the position of the opening of the spiracle has little systematic value for the group. Again, the presence or absence of trichobothria as a character is difficult to use, more particularly on very small spiders, since trichobothria are often colorless, and their base is little differentiated from the bases of surrounding hairs and bristles.

Simon's division of the sub-family into two groups seems equally difficult to use. He separates the *Tetragnatheae* from the *Pachygnatheae* by the relative width and length of the labium and straight or inclined maxillae. With the Hispaniola material, these characters are not constant and can not be used to divide the *Tetragnathinae* into two groups, so the five genera are treated here as a unit. The male palpi of all are similar, with a narrow paracymbium parallel to the cymbium, a large spherical bulb only partly covered by the cymbium, and embolus and conductor at tip of the bulb. The mandibles of the male may be divergent, porrect, geniculate or vertical.

Key to Genera

Males

1. Opening of posterior spiracle a transverse slit midway between genital fold and spinnerets ..... *Glenognatha*
   Opening of posterior spiracle close to spinnerets 2
2. Second femur with a retrolateral specialized spine from a raised base .... *Agriognatha*
   Second femur with no specialized spine 3
3. Mandibles vertical, only slightly divergent 4
   Mandibles divergent or porrect 5
4. Superior margin of fang groove with three or four small teeth, inferior margin with granules, opening of posterior spiracle not chitinized ..... *Antillognatha*
   Only small teeth on fang groove, opening of posterior spiracle a transverse chitinized slit, divided by a median septum ..... *Mimognatha*
5. A large spur above base of fang, usually many teeth on both margins of fang groove ..... *Tetragnatha*
   No spur above at base of fang, three sharp teeth on superior margin of groove, four small teeth on inferior margin ..... *Hispanognatha*

Females

1. Opening of posterior spiracle midway between genital fold and spinnerets *Glenognatha*
   Opening of spiracle near spinnerets 2
2. Opening of spiracle divided ..... *Mimognatha*
   Opening of spiracle entire 3
3. Small spiders with an oval abdomen ..... *Hispanognatha*
   Large spiders with a long, cylindrical abdomen 4
4. Fang groove with many graduated teeth on both margins .... *Tetragnatha*
   Only three or four teeth on upper margin of fang groove ..... *Agriognatha*

Genus Agriognatha O.P.-Cambridge 1896

The genus *Agriognatha* was based by O.P.-Cambridge in 1896, on the species *bella* from Costa Rica. At the same time, he realized that a species that he had described previously as *Tetragnatha pachygnathoides* belonged to the same genus. Later, F.O.P.-Cambridge in revising the genus, added one more species, *Argyroepeira lepida* O.P.-Cambridge. At this time, it was found that the genus *Cyrtognatha* Keyserling, 1881, was the same but that the name was preoccupied by Faldermann, 1835, in Coleoptera. The type of *Cyrtognatha* is *nigrivittata* Keys. from Peru and was described from a male. The abdomen of this species extends beyond the spinnerets and the mandibles are widely divergent with a large tooth or cusp above at the base of the fang. Later, Simon described a male and female of this genus from St. Vincent and Franganillo has described two more species from Cuba giving little more than the bare generic characters.

No mention is made of the trichobothria on the posterior femora in any of these species. This is not surprising, as they are colorless and difficult to see except under high magnification. In *A. simoni* Bryant from Cuba and *A. rucilla* spec. nov., the trichobothria are short and colorless and form a median ventral row on the third and fourth femora. In *A. argyra* spec. nov. and *A. espanola* spec. nov. they are in a basal prolateral row on the third and fourth femora and are much longer in the female than in the male. All three species from Hispaniola have similar mandibles with the same number of teeth on the fang groove. In the males, the specific difference is in the size and the palpi.

In all species, the opening of the posterior spiracle is close to the spinnerets.

Agriognathia argrya spec. nov

Figure 35

Male. Length, 4.7 mm., ceph. 2.0 mm., abd. 3.1 mm., spread of mand. 2.2 mm.

Cephalothorax pale brown, darker about margins and in median area, low and flat, anterior margin narrowed, groove very near posterior margin and punctiform, a pair of deep pits midway between lateral eyes and groove and in line between eyes and groove; *eyes* cover anterior margin, in three groups, lateral eyes touching, on a tubercle higher in front than behind, anterior row strongly recurved, a.m.e.

separated by less than a diameter, posterior row slightly recurved, p.m.e. little larger than a.m.e., separated by little more than a radius; *quadrangle* higher than wide and slightly wider in front; *clypeus* almost wanting below a.m.e.; *mandibles* vertical, strongly divergent, so that greatest width is more than length of cephalothorax, brown, smooth, a large cusp over base of fang, suggestive of *Pachygnatha*, fang groove horizontal, superior margin with three teeth, one very near median margin, inferior margin with four teeth, the two middle teeth quite close together, fang longer than groove, sinuous, with tooth about middle, tip abruptly bent; *labium* brown, wider than long with tip rebordered; *maxillae* brown, more than twice as long as labium, sides parallel, tip abruptly widened; *sternum* pale brown, triangular, as wide as long, ending in a slender point between IV coxae, convex, excavate opposite III and IV coxae; *abdomen* cylindrical, pale, with many silvery spots, a faint gray median stripe with irregular margins on posterior half, venter pale, opening of spiracle close to spinnerets; *legs*, 1–2–4–3, anterior pairs very long, pale, with tips slightly darker, spines, I pair, femur, ventral, row of 3 short spines near base, prolateral, 6 long black spines, retrolateral, 4 long spines and an irregular group of short spines that are not the same on the right and left legs, tibia, with few short spines, metatarsus longer than tibia, with a row of small spicules on basal two-thirds, II pair, femur, ventral, 2 short spines near base, retrolateral, an irregular row of long spines ending with a slender specialized spine near tip, this spine from a raised base, not as long and heavy as in most species of the genus, rubs against a groove on the patella, a very small median spine at apex easily overlooked, metatarsus little longer than tibia, with smaller spicules than on I pair, III and IV pairs much shorter than anterior pairs, with scattered spines and a basal row of 4 very long colorless trichobothria on dorsal prolateral side of femora, longer on IV femur than on III; *palpus* pale, about as long as cephalothorax, trochanter long, femur very long and slender, patella and tibia of equal length, paracymbium very slender, with tip slightly enlarged, with no hairs, scarcely reaches middle of bulb, bulb a flattened sphere with embolus and conductor at top.

Female. Length, 6.5 mm., ceph. 3.0 mm., abd. 4.0 mm.

Cephalothorax same as in male but not as strongly colored, and the pair of pits not as distinct; *eyes* same as in male but p.m.e. not quite as close together; *clypeus* almost wanting below a.m.e.; *mandibles* same color as cephalothorax, vertical, strongly geniculate, no boss, fang groove oblique, superior margin with three strongly chitinized teeth,

inferior margin with four teeth, second from base of fang very small, fang evenly curved; *labium, maxillae* and *sternum* same as in male; *abdomen* cylindrical, twice as long as wide, widest at posterior end, pale brown with many silvery spots and two pairs of brown spots above spinnerets, venter pale brown with scattered silvery spots; *legs*, 1–2–4–3, anterior pairs very long and the dark bands more distinct than on posterior pairs, spines scattered, no cusps or spines on anterior metatarsi, no specialized spine on II femur, trichobothria of prolateral row on posterior femora longer than in male; *epigynum* a curved chitinized fold between book lungs, that shows no structure.

Holotype ♂ Dom. Rep.; Cordillera Central, rain forest north of Valle Nuevo, 6,000+ feet, August 1938, (Darlington)

Allotype ♀ Dom. Rep.; Cordillera Central, rain forest north of Valle Nuevo, 6,000+ feet, August 1938, (Darlington)

Paratype ♂ Dom. Rep.; Loma Rucilla Mountains, north of Cordillera Central, 5,000–8,000 feet, June 1938 (Darlington)

Paratype ♂ ♀ Dom. Rep.; foot hills of Cordillera Central, south of Santiago 2,000–5,000 feet June 1936, (Darlington)

Agriognatha espanola spec. nov.

Figure 34

Male. Length, 3.4 mm., ceph. 1.0 mm., abd. 2.5. mm.

Cephalothorax pale brown, median area darker, anterior margin much narrowed, cephalic portion slightly higher than thoracic, groove very near posterior margin and punctiform, a pair of grooves midway between lateral eyes and thoracic groove; *eyes* cover entire width of head, lateral eyes touching, anterior row recurved, eyes subequal, a.m.e. separated by more than a diameter and from a.l.e. by more than two diameters, posterior row straight, p.m.e. slightly larger than a.m.e. and surrounded by a much wider dark ring; *quadrangle* higher than wide and the same width in front as behind; *clypeus* equals about a radius of a.m.e.; *mandibles* dark brown, basal portion roughened and distal half narrowed, strongly divergent, two-thirds as long as cephalothorax, no boss, and a very small tooth or cusp over base of fang, fang groove horizontal, poorly defined, superior margin with two widely separated sharp teeth and a few long bristles, inferior margin with four widely separated teeth, all smaller than those on opposite margin, fang longer than groove, sinuous, with tip abruptly bent; *labium* dark brown, slightly wider than long, tip strongly rebordered; *maxillae* more

than twice as long as labium, sides parallel and tips slightly widened; *sternum* light brown, triangular, about as wide as long, with tip pointed between IV coxae, only slightly excavate between coxae; *abdomen* cylindrical, silvery, with three pairs of divergent black spots on posterior third, venter with two parallel silvery stripes and silvery spots, opening of spiracle directly anterior to spinnerets; *legs*, 1–2–4–3, anterior pairs very long, pale brown with ends of anterior tibiae darker, spines, all patellae with a long strong spine at tip, I pair, femur, ventral, 4 black basal spines, all longer than the diameter of the joint, a retrolateral row of 11 shorter spines from base to tip, tibia with a few lateral and ventral spines, metatarsus longer than tibia, with a ventral row of 13–14 short dark cusps or spicules, tarsus about two-thirds length of metatarsus, II pair, femur with ventral row of 8 short spines on basal third, retrolateral row of 11 short spines from base to tip, prolateral row of longer spines, a slender retrolateral spine from a raised base near tip which rubs against a ventral ridge on patella, tibia with a few lateral and ventral spines, tibia longer than metatarsus, metatarsus with ventral row of cusps smaller than on I pair, posterior pairs much shorter, no ventral spines on femora, a short prolateral basal row of long trichobothria on III femur; palpus pale, shorter than cephalothorax, patella and tibia of equal length, each about diameter of joint, paracymbium very slender, extending beyond middle of the bulb and tip expanded, cymbium slender, sides almost parallel, with tip curved in towards bulb, bulb almost spherical, with conductor and embolus in an elliptical coil, ending with slender spine-like processes, the apical longer and more curved than the preapical.

Female. Length, 5.0 mm., ceph. 2.0 mm., abd. 3.0 mm. long, 20. mm. high.

Cephalothorax very low, not as much narrowed as in male, coloring same as male, groove in a deep depression very near posterior margin; *eyes* same as in male; *mandibles* brown, vertical, geniculate, no boss, fang groove oblique, superior margin with two teeth, inferior margin with three teeth, fang evenly curved; *labium* and *maxillae* same as in male; *sternum* dark brown, convex, triangular, as wide as long; *abdomen* pale, oval, with a large dorsal tubercle posterior to middle, a broad dark median stripe from base to spinnerets, sides dull with small silvery spots and dark stripes, venter with a broad median dark stripe from pedicel to spinnerets, with a pale stripe each side, two silvery spots each side of spinnerets, opening of posterior spiracle obscure; *epigynum* a simple curved fold; *legs*, 1–2–4–3, brown, darker at tips of joints, pale ventral spots at tip of anterior femora and patellae quite

conspicuous, anterior pairs very long, no row of ventral spines on femora, prolateral row of 3 strong spines near base on first femur, no cusps on tibia or metatarsus, II and III metatarsi and tarsi with prolateral row of short stiff bristles, much heavier on III pair, III and IV femora with prolateral row of trichobothria on basal half of joint.

Holotype ♂ Haiti; Kenskoff, 3,000–4 000 feet, 1 May 1935, (Roys)

Allotype ♀ Haiti; Kenskoff, 3,000–4,000 feet, 1 May 1935, (Roys)

Paratypes ♂ ♀ Haiti; Kenskoff, 3,000–4,000 feet, 1 May 1935, (Roys)

Paratype ♂ Haiti; Dame-Marie, 1941, (Audant)

The female of *Agriognatha espanola* quite unlike others in the genus, has a large tubercle on the abdomen.

Agriognatha rucilla spec. nov.

Figure 33

Male. Length, 5.0 mm., ceph. 2.1 mm., abd. 3.5 mm., spread of mand. 3.5 mm.

Cephalothorax brown, darker about margin and in median area, low and flat, anterior margin narrowed, thoracic groove very near posterior margin and punctiform, faint lateral grooves from margin to near thoracic groove; *eyes* cover entire margin, in three groups, lateral eyes touching and subequal, anterior row recurved, a.m.e. separated by a full diameter, posterior row straight, p.m.e. larger than a.m.e., separated by about a radius; *quadrangle* higher than wide, and wider in front; *clypeus* below a.m.e. not as high as diameter of a.m.e.; *mandibles* pale brown, widely divergent, so that greatest spread is more than length of cephalothorax, base slightly swollen, a large outward turning cusp at base of fang, groove horizontal, superior margin with three sharp teeth, one very near median margin, inferior margin with four sharp teeth, two middle close together, fang longer than groove, slender, a large tooth about middle on left fang and a swelling at same place on right, tip abruptly bent; *labium* brown, wider than long, tip rebordered; *maxillae* more than twice as long as labium, sides parallel, tip only slightly widened; *sternum* brown, triangular, slightly longer than wide, emarginate opposite III and IV coxae; *abdomen* cylindrical, dull gray, with median dark stripe from base to spinnerets, margins much darker, each side thickly covered with silvery spots, venter mottled with silvery spots and a pair of vague dark spots about middle, inconspicuous opening of posterior spiracle; *legs*, 1–2–4–3, pale with

vague darker rings on femora and tibiae, anterior pairs longer, spines, I pair, femur, ventral, a median row of 6 short spines near base, scattered prolateral, retrolateral and dorsal spines, tibia, scattered long black spines, metatarsus longer than tibia, with a few ventral spicules, II pair similar to I pair but fewer median ventral spines on femur and a retrolateral clasping spine from a raised base near tip, metatarsus longer than tibia, III metatarsus with prolateral and retrolateral rows of bristles, III and IV femora with median ventral row of very short trichobothria, so small that they are easily overlooked; *palpus* pale, about as long as cephalothorax, trochanter about one-third as long as femur, tibia little longer than patella, paracymbium very slender, tip much widened, not reaching middle of bulb, cymbium with parallel sides, hairy, bulb, a flattened sphere, with embolus and conductor at tip.

Female. Length, 5.5 mm., ceph. 2.1 mm., abd. 4.0 mm.

Cephalothorax, coloring same as male, anterior margin not as much narrowed, low and flat, thoracic groove not as near posterior margin as in male; *eyes* same as in male; *mandibles* brown, vertical, geniculate, no boss, fang groove oblique, superior margin with three sharp teeth, inferior margin with four large sharp teeth, fang evenly curved; *labium*, *maxillae* and *sternum* same as in male; *abdomen* cylindrical, more than twice as long as broad, base slightly bifid, with a median dark herringbone stripe with darker margins, sides with silvery spots, venter with a broad dark stripe, abruptly widened about middle, with a narrow stripe of silvery spots each side, openings of spiracle obscure, spinnerets at end of abdomen; *legs*, 1–2–4–3, much broken, brown, femora and tibiae with wide dark rings, spines long and black, no ventral row of short spines on anterior femora, and trichobothria very inconspicuous in ventral row on III and IV femora; *epigynum*, a simple curved fold showing no structure.

Holotype ♂ Dom. Rep.; Loma Rucilla Mountains, north of Cordillera Central, 5,000–8,000 feet, June 1958, (Darlington)

Allotype ♀ Dom. Rep.; Loma Rucilla Mountains, north of Cordillera Central, 5,000–8,000 feet, June 1938, (Darlington)

Paratypes 2♂ Dom. Rep.; Loma Rucilla Mountains, 5,000–8,000 feet, June 1938, (Darlington)

The two male paratypes are much smaller than the holotype but the teeth are the same on the fang groove and the tooth is on the fang.

Genus Antillognatha gen. nov.

Cephalothorax low; eyes, anterior row strongly recurved, posterior row almost straight, lateral eyes on separate tubercles and separated by a line, p.m.e. largest of the eight; quadrangle longer than wide; mandibles vertical, only slightly divergent, upper margin of fang groove with three or four very small teeth, lower margin with a row of granules; labium wider than long, sides almost parallel, tip rebordered; maxillae narrow, fully twice as long as labium; abdomen oval, more than half as wide as long, opening of posterior spiracle very near spinnerets and not chitinized. Male only known.

Genotype *Antillognatha lucida* spec. nov.

Antillognatha differs from *Hispanognatha* by the lateral eyes almost touching, the small granules on lower margin of the fang groove, and the much shorter abdomen. It differs from *Dyschiriognatha* and *Glenognatha* by the granules on the fang groove, and the opening of the posterior spiracle. It differs from *Pachygnatha* by the width of the labium, the very small teeth on the fang groove and the small size.

Antillognatha lucida spec. nov.

Figure 31

Male. Length, 1.9 mm., ceph. 1.0 mm., abd. 1.1 mm. long, 0.6 mm. wide.

Cephalothorax pale brown, rather low, anterior margin not much narrowed, thoracic depression quite near posterior margin and transverse; *eyes* cover anterior margin, anterior row strongly recurved, a.m.e. separated by a diameter and a little more from a.l.e., posterior row same length as anterior, almost straight, eyes equidistant, lateral eyes on separate tubercles that touch at base, p.m.e. separated by more than a diameter, largest of the eight; *quadrangle* longer than wide, and wider behind than in front; *clypeus* little higher than diameter of a.m.e.; *mandibles* vertical, only slightly divergent, distal half granular, with a small hook above base of fang, fang groove oblique, superior margin with three or four minute teeth and a row of colorless bristles, inferior margin with a row of minute granules, fang long, slender and sinuous; *labium* dark brown, wider than long, tip rebordered and about as wide as base; *maxillae* fully twice as long as labium, narrow, tips not widened, slightly inclined; *sternum* dark brown, triangular, as wide as long, convex, carried between II and III coxae, ending in a broad

lobe between IV coxae, so that coxae are separated by almost a diameter, posterior coxae globular; *abdomen* oval, two-thirds as wide as long, shining, no hairs, paler brown than cephalothorax, with a pair of widely separated lines of silvery spots from base to spinnerets, venter brown, genital fold only slightly posterior to openings of book lungs, opening of posterior spiracle directly anterior to spinnerets and not chitinized; *legs*, 1–2–4–3, paler than cephalothorax, no spines and very few hairs, I pair very long, tarsus short, IV femur with a dorsal row of trichobothria; *palpus* not as long as cephalothorax, bulb very large, both patella and tibia as long as diameter of joint, paracymbium very slender, not reaching tip of bulb, tip widened and ending in a truncate lobe, bulb a much flattened sphere, cymbium long and slender, extending beyond the bulb, conductor and embolus form a narrow loop at top of bulb with long straight free ends which rest against the tip of cymbium.

Antillognatha lucida is smaller than *Mimognatha foxi* (McCook) found in North and Central America and some of the islands of the Caribbean. The opening of the posterior spiracle is entire, not chitinized and is very near the spinnerets, the labium has almost parallel sides and the embolus and conductor form a much larger loop at the tip of the bulb.

Genus Glenognatha Simon 1887

The genus *Glenognatha* was based by Simon on a small spider from Arizona and named for Mr. J. H. Emerton. Unfortunately, this species is not in the museum collection. The genus differs from *Pachygnatha* by the anterior legs that are much longer than the posterior, (in *Pachygnatha* there is little difference in the length of legs), the longer labium, and the position of the posterior spiracle which is midway between the genital fold and the spinnerets and opens by a transverse slit with heavily chitinized margins.

The small spider figured by McCook, (1893), as *Theridion foxi* was recognized by Banks in 1929 as his *Mysmena bulbifera* that had been placed in the genus *Glenognatha* by Barrows in 1924, who found the spider in its web. Banks, (1929), erected the genus *Mimognatha* for it, separating it from *Glenognatha* by the small mandibles, that are not divergent, and with only small teeth on the fang groove. The opening of the spiracle also is a chitinized transverse slit but it is divided by a median septum and is very near the spinnerets. The third femur has two parallel ventral rows of trichobothria.

It is not impossible that the species from St. Vincent described by Simon as *Dyschiriognatha montana* is a *Glenognatha*, as the male is described as with very long anterior legs and the genus *Dyschiriognatha* is based on a species from Sumatra in which the legs vary little in length.

Glenognatha mira spec. nov.

Female. Length, 3.0 mm., ceph. 1.2 mm., abd. 1.7 mm.

Cephalothorax dark brown, cephalic portion elevated, thoracic depression one-third from posterior margin, a transverse pit; *eyes* cover anterior margin, anterior row strongly recurved, a.m.e. largest of the eight, separated by fully a diameter and from a.l.e. by a little less, posterior row straight, lateral eyes touching on a common tubercle, p.m.e. little smaller than a.m.e., separated by little more than a diameter and from p.l.e. by more than a diameter more; *quadrangle* wider in front, and as high as wide; *clypeus* higher than quadrangle, concave, with a distinct groove midway between a.m.e. and margin; *mandibles* brown, vertical, slightly roughened, upper margin of groove with three equidistant teeth, lower margin with four small teeth; *labium* dark brown, wider than long, and wider at base than at tip; *maxillae* twice as long as labium, slightly inclined, sides parallel; *sternum* dark brown, triangular, longer than wide, convex, carried between II and III coxae, emarginate opposite III and IV coxae, ending in a broad lobe between IV coxae, posterior coxae globular; *abdomen* globular, dorsum infuscate, a few silvery dots, sides silvery, venter convex, with a broad dark stripe from pedicel to spinnerets and a pair of widely separated silvery spots about middle, opening of posterior spiracle a strongly chitinized slit midway between epigynum and spinnerets; *legs* 1–2–4–3, anterior pairs very long, pale brown, spineless, but rows of hairs, I tibia longer than I metatarsus, III femur, two parallel ventral rows of trichobothria from base which disappear before reaching tip; *epigynum* a procurved line ending in silvery spots, midway between pedicel and spinnerets.

Holotype ♀ Haiti; Miragoane, 2 November 1934, (Darlington)

Genus Hispanognatha gen. nov.

Cephalothorax oval, low; both rows of eyes recurved, lateral eyes on separate tubercles; quadrangle narrowed in front and as high as wide behind; mandibles divergent, two-thirds as long as cephalothorax,

upper margin of fang groove with three sharp separated teeth, lower margin with four smaller teeth; labium wider than long, sides parallel with tip strongly rebordered; maxillae more than twice as long as labium, narrow, slightly inclined; abdomen twice as long as wide, opening of posterior spiracle obscure; legs spineless, anterior pairs long, a short dorsal basal row of long trichobothria on all femora; palpus very similar to *Pachygnatha*. Male only known.

Genotype, *Hispanognatha guttata* spec. nov.

The genus *Hispanognatha* differs from *Dyschiriognatha* and *Glenognatha* by the opening of the posterior spiracle near the spinnerets, by the elongate abdomen, and the labium as wide at tip as at the base. It differs from *Pachygnatha* by the divergent mandibles, the labium, the long maxillae, and the elongate abdomen.

Hispanognatha guttata spec. nov.

Figure 36

Male. Length, 3.5 mm., ceph. 1.3 mm., abd. 2.4 mm. long, 1.1 mm. wide.

Cephalothorax dull brown, with darker stripes converging from below lateral eyes to thoracic groove, a dark marginal line, low and flat, anterior margin only slightly narrowed, thoracic depression quite near the posterior margin; *eyes* cover entire anterior margin, anterior row recurved, a.m.e. separated by fully a diameter and from a.l.e. by more than two diameters, a.l.e. slightly smaller than a.m.e., posterior row slightly longer than anterior, and not as much recurved, eyes equidistant, p.m.e. largest of the eight, separated by more than a diameter and from p.l.e. by fully a diameter and a half, lateral eyes on separate tubercles that are connected at base, separated by more than a diameter, a.l.e. smaller than p.l.e.; *quadrangle* narrower in front and higher than wide behind; *clypeus* below a.m.e. higher than diameter of a.m.e.; *mandibles* two-thirds as long as cephalothorax, slightly divergent, no boss, with a strong curved tooth that projects forward near exterior margin about one-third above base of fang, several long bristles on distal third, fang groove oblique, superior margin with three long slender teeth, inferior margin with four much smaller teeth, fang as long as groove, curved, with distinct swelling near basal third; *labium* dark brown, wider than long, sides parallel, tip rebordered; *maxillae* nearly three times as long as labium, slightly inclined, narrow; *sternum* four-fifths as wide as long, triangular, convex, carried between coxae

and continued in a broad lobe between IV coxae; *abdomen* light brown, covered with pale silvery spots, two irregular converging dark lines from before the middle to spinnerets, about twice as long as wide, widest at basal third, venter with a wide dark stripe from pedicel to spinnerets, with silvery spots each side, opening of posterior spiracle indistinct; *legs*, 1–2–4–3, anterior pairs very long, pale brown with femora darker, no spines or cusps but rows of very fine hairs, a few long trichobothria in a dorsal basal row on all femora; *palpus* longer than cephalothorax, femur long and slender, tibia slightly longer than patella, paracymbium very narrow, sides almost parallel, tip bent, bulb a flattened sphere with embolus and conductor at tip in a small circle, free ends of both in a simple curve beyond bulb.

Holotype ♂ Dom. Rep.; Cordillera Central, Valle Nuevo, south west of Constanza, 7,000 feet, August 1938, (Darlington)

Genus Tetragnatha Latreille 1804

Tetragnatha elongata Walckenaer

Tetragnatha elongata Walckenaer, 1805, p. 69. "Bosc manuscrit sur les araignèes de la Caroline, pl. 5, fig. 5."

♀ Dom. Rep.; Puerto Plata, July 1941, (Hurst)

Tetragnatha festina spec. nov.

Figures 38, 39, 40, 41

Male. Length, 7.4 mm., ceph. 2.7 mm., abd. 5.0 mm., mand. 2.6 mm.

Cephalothorax pale brown, no markings; *eyes* about cover anterior margin, both rows recurved, space between lateral eyes less than between median, lateral eyes on separate tubercles; *mandibles* porrect, almost as long as cephalothorax, dorsal spur pointed with a large ventral tooth, the first tooth at base of fang not large and directed forward, second tooth larger than first and directed upward, followed by two teeth, then a space and eight graduated teeth, the last only a granule, only six are seen from dorsal side, inferior margin with a shorter row of eleven graduated teeth, fang with a small ventral tooth near middle and thickened near base; *labium* longer than wide, tip rebordered; *sternum* triangular, carried between I and II and II and III

coxae; *abdomen* cylindrical, nearly four times as long as wide, spinnerets at tip, pale brown with paler flecks, no distinct markings; *legs*, 1–2–4–3, first pair very long, few spines, a few tricobothria at base of IV femur; *palpus* as long as cephalothorax, tibia one and a half times as long as patella, paracymbium with the usual chitinized lobe about middle, with tip bifid.

Female. Length, 11.5 mm., ceph. 2.6 mm., abd. 9.0 mm., mand. 2.1 mm.

Cephalothorax and *eyes* as in male; *mandibles* porrect, but not as long as in male, thicker at base and more divergent, no dorsal spur, two cone-shaped teeth on superior margin near base of fang, followed by a space and then eight graduated teeth as in male, inferior margin with eleven graduated teeth from fang to base, fang long and sinuous but with no ventral tooth as in male, a thickened area near base is produced in a dorsal tooth; *labium* and *sternum* as in male, more trichobothria on IV femur than in male; *epigynum* a small curved slit posterior to openings of the book lungs.

Holotype ♂ Dom. Rep.; foot hills of Cordillera Central, south of Santiago, 1,000–3,000 feet, June 1938, (Darlington)

Allotype ♀ Dom. Rep.; foot hills of Cordillera Central, south of Santiago, 1,000–3,000 feet, June 1938, (Darlington)

Paratype ♂ Haiti; Diquini, November 1912, (Mann)

Tetragnatha festina is separated from other species of the genus found in Hispaniola, in the male, by the second tooth from the base of the fang that is directed upward and outward, from the plane of the mandible, and in the female, by the long sinuous fang with a distinct tooth near the base.

Tetragnatha haitiensis spec. nov.

Figure 37

Female. Length without mand., 8.0 mm., ceph. 2.6 mm., abd. 5.6 mm., mand. 2.4 mm.

Cephalothorax brown, with darker brown shading, quite flat, thoracic depression very near posterior margin; *eyes*, anterior row recurved, a.m.e. separated by about a diameter and slightly larger than p.m.e., posterior row very slightly recurved, p.m.e. separated by more than a diameter, less space between lateral eyes than between median eyes; *quadrangle* longer than wide, and slightly narrower in front; *mandibles* slender, divergent, superior margin, no dorsal spur, one sharp tooth

at base of fang, followed by a space, then a small tooth directed forward, followed by six equally spaced, graduated teeth, inferior margin with a very long tooth or lobe at base of fang, directed forward, as seen from dorsal side, a short heavily chitinized tooth at inner base of the fang, followed by a space, then two small subequal teeth and a row of 10–12 graduated teeth; fang not as long as groove but extending the length of the rows of teeth, sinuous, with a ventral tooth about middle; *sternum* longer than wide, and carried between I and II coxae and between II and III coxae; *abdomen*, base not bifid, pale brown, with a pair of wavy darker stripes from base to spinnerets; *legs*, 1–2–4–3, brown, I pair very long, spines irregular, III and IV femora with a prolateral row of short trichobothria best seen from ventral side.

Holotype ♀ Haiti; Ennery, 7 September 1934, (Darlington)

Paratype ♀ Haiti; Grand Riviere, January 1913, (Mann)

Paratype ♀ Haiti; Kenskoff, 4,300 feet, 3 May 1935, (Roys)

Tetragnatha haitiensis belongs near *T. antillana* Simon. The latter species has evidently been misidentified by Seely, (1929, p. 105) and F.O.P.-Cambridge, in the Biol. Centr. Amer., 1903, 2: 433, pl. 41, figs. 5, 6, the specimens that they describe and figure do not have the two subequal but strongly divergent teeth near the base of the fang on the dorsal side of the male mandible and the single isolated tooth on the lower margin of the female mandible that Simon describes. However, the female described by Seely and Cambridge, has the long tooth or lobe that is directed forward at the base of the fang on the lower side.

Tetragnatha haitiensis known only from the female, differs from *T. antillana* Simon, by the smaller size, the long sinuous fang with a tooth on the ventral side, the two rather widely separated teeth, instead of one, and the more numerous teeth on the lower margin of the fang groove. Both have the long lobe or tooth at the base of the fang on the ventral side that projects forward.

Tetragnatha orizaba (Banks)

Eugnatha orizaba Banks, 1898, p. 248, pl. 15, fig. 16. "one pair from Mt. Orizaba"

2 ♂ Dom. Rep.; Puerto Plata, July 1941, (Hurst)

2 ♂ 1 ♀ Dom. Rep.; San Jose de las Matos, 1,500+ feet, June 1938, (Darlington)

Tetragnatha pallescens F.O.P.-Cambridge

Tetragnatha pallida Banks, 1892, p. 51, pl. 5, figs. 88, 88a. "2 ♂ Upper Cayuga Lake Basin" nec *pallida* O. P.-Cambridge, 1889.
Tetragnatha pallescens F.O.P.-Cambridge, 1905, p. 436

♀ Haiti; Port-au-Prince, 1–5 September 1934, (Darlington)
♂ ♀ Haiti; Trou Caiman, 4 September 1934, (Bates)

Tetragnatha tenuissima O.P.-Cambridge

Tetragnatha tenuissima O.P.-Cambridge, 1889, p. 9, pl. 1, figs. 1, 2. "♂ ♀ Guatemala, upper road to Chichochee near Coban, Tomahu; Costa Rica; Panama."

♀ Haiti; hills near Port-au-Prince, 2,000 feet, 2 October 1934, (Darlington)
♀ Dom. Rep.; Puerto Plata, April 1941, (Hurst)

Subfamily THERIDIOSOMATINAE

Key to Genera

1. Abdomen much wider than long ..... *Allototua*
   Abdomen globose 2
2. A.M.E. largest of the eight, sternum triangular ..... *Wendilgarda*
   P.M.E. largest of the eight, sternum rectangular ..... *Ogulnius*

Genus Allototua gen. nov.

Cephalothorax as wide as long, slightly convex, no thoracic groove, anterior margin much narrowed; eyes, anterior row recurved, a.m.e. diurnal, separated by a diameter and a little nearer a.l.e., posterior row straight, eyes equidistant, p.m.e. largest of the eight, lateral eyes on a common tubercle and almost touching; quadrangle wider than long, as wide behind as in front; clypeus as high as quadrangle; labium fused to sternum, wider than long; maxillae very broad, inclined over labium; sternum wider than long, convex, posterior margin little narrower than anterior; abdomen wider than entire length of spider, widest posterior to middle, does not extend over cephalothorax; legs rather short, no spines, with a distinct bristle at tip of patella and a median dorsal bristle on posterior tibia; epigynum small. Male not known.

Genotype *Allototua guttata* spec. nov.

Allototua differs from *Theridiosoma* by the very wide sternum, equidistant eyes of the posterior row and the bristles at the tip of the patellae; it differs from *Totua* Keyserling 1891, by the shorter legs, fewer bristles on tibiae and the eyes of the posterior row; from *Ogulnius* O.P.-Cambridge, 1882, by the very wide abdomen that does not extend over the cephalothorax, the higher clypeus, and the eyes of the anterior row.

Ogulnius Cambridge, 1882, is based on a very small spider, (1/24 inch=0.5 mm.), with a globular abdomen that extends far over the cephalothorax. Keyserling, Theridiidae, 2: 249, has placed in the genus two more species, both known only from females from Southern Brazil. Both are 2.0 mm. long. One is described with a strong bristle at the tip of the patellae and a dorsal basal bristle on tibiae. The genus *Totua* was described by Keyserling in the Brasilianische Spinnen, 1891, (p. 216) but was omitted by Simon in the Histoire Naturelle des Araignées. *Totua* is also from southern Brazil. The quadrangle of eyes is narrower in front, clypeus lower than quadrangle, abdomen oval, and not extending over cephalothorax, legs long, with a bristle at tip of patellae and two bristles on tibiae.

Allototua guttata spec. nov.

Figures 42, 45

Female. Length, 2.0 mm., ceph. 0.7 mm., abd. 1.6 mm. long 2.0 mm. wide.

Cephalothorax pale yellow with a distinct marginal black stripe and three pairs of small black spots inside margin, no thoracic groove, moderately convex, a pair of very long bristles directed forward on thoracic slope, about as wide as long, anterior margin very narrow; *eyes* cover anterior margin, anterior row recurved, a.m.e. diurnal, strongly convex, separated by a diameter and from a.l.e. by a little less, posterior row almost straight, eyes equidistant, p.m.e. largest of the eight, rather flat, separated by a little less than a diameter, lateral eyes almost touching, on a common tubercle; *quadrangle* as wide behind as in front and wider than high; *clypeus* as high as quadrangle; *mandibles* pale and weak, vertical, fang groove horizontal; *labium* pale, fused to sternum, wider than long; *maxillae* pale, twice as long as labium, broad, inclined over labium, so that tips almost meet; *sternum* pale, with many gray dots irregularly placed, strongly convex, wider

than long, with a few hairs, posterior margin fully two-thirds the anterior, so that IV coxae are separated by more than a diameter; *abdomen* as wide as entire length of spider, not extending over cephalothorax, widest posterior to middle, basal half very high, pale, with irregular dark blotches and smaller cream-colored spots, distal third slopes rapidly, with two parallel transverse rows of dark spots, followed by three longitudinal pairs of dark dots, venter pale, two distinct pairs of dark spots just above spinnerets; *legs*, 1–2–4–3, rather short, pale, with paired lateral dark spots on femora, patellae and tibiae, many long colorless hairs, and a long bristle at tip of patellae, a dorsal basal bristle on III and IV tibiae; *epigynum* rather small, a pale oval lobe, with heavily chitinized margins.

Holotype ♀ Dom. Rep.; Loma Viega, Cordillera Central, south of Constanza, 6,000 feet, August 1938, (Darlington)

Genus Ogulnius O.P.–Cambridge 1882

Ogulnius fulvus spec. nov.

Figures 46, 47

Female. Length, 1.4 mm.

Cephalothorax pale yellow, about as wide as long, cephalic portion very high, with a few long bristles posterior to eyes on margins, three pairs of dark elongated radial striae, abdomen extends so far over cephalothorax obscuring the thoracic groove; *eyes* raised on a turret, anterior row recurved, a.m.e. diurnal, largest of the eight, separated by less than a line, a.l.e. smaller, and separated from a.m.e. by almost a diameter of a.m.e., posterior row slightly procurved, lateral eyes touching, p.m.e. separated by more than a diameter; *quadrangle* narrower in front and higher than wide; *labium* wider than long, not fused to sternum, tip narrowed; *maxillae* almost twice as long as labium, inclined, very broad; *sternum* as wide as long, convex, not carried between coxae, posterior margin two-thirds as wide as anterior, with a circular pit each side of labium; *abdomen* globose, higher than long, covering the thoracic portion of the cephalothorax, to the ocular tubercle, pale brown with a few paler blotches, a pair of dark spots directly posterior to anterior muscle spots, smooth, with very few hairs, anterior muscle spots close together, posterior muscle spots widely separated, venter pale, colulus present; *legs* 4–1–2–3, pale yellow, quite short and stout, a long bristle at tip of patellae and middle of tibiae, I tibia enlarged and little longer than patella; *epigy-*

num very near to pedicle, a broad curved chitinized slit, showing no structure.

Holotype ♀ Dom. Rep.; foot hills of Cordillera Central, south of Santiago, 2,000–5,000 feet, June 1938, (Darlington)

Paratype ♀ Dom. Rep.; San Jose de las Matas, 1,500 feet, June (1938, (Darlington)

The genus *Ogulnius* was based by Cambridge in 1882, on a species from the Amazon known only from a female. Later, Simon has added to the genus, one species from Ceylon and one from St. Vincent. Cambridge has several figures which show that *fulvus* agrees with the genotype in the three pairs of diagonal dark marks on the margin of the cephalothorax and a larger pair directly posterior to the p.m.e. but the a.m.e. are much longer than the figure of the genotype. The male is not known.

Genus Wendilgarda Keyserling 1886

Wendilgarda theridionina Simon

Vendilgarda theridionina Simon, 1895, 1, p. 919, fig. 986. "♂ ♀ Venezuela; San Esteban"

♀ Haiti; Grande Anse, (Uhler)

♂ ♀ Dom. Rep.; Puerto Plata, 30 August 1938, (Darlington)

♀ Dom. Rep.; Cordillera Central, Constanza, 3,000–4,000 feet, August 1938, (Darlington)

This species was first described from Venezuela and has since been found widely distributed among the islands of the Caribbean. Petrunkevitch has a full description of both sexes in his Spiders of Porto Rico, 1930, p. 297. With strong direct light, small circular pits are seen on the sternum, each side of the labium. These are larger and more distinct in the female than in the male.

Subfamily GASTERACANTHINAE

Key to Species

1. Head elevated, abdomen extending over thorax, wider than long.....2
   Head not elevated, abdomen not extending over thorax, longer than wide.....3
2. Abdomen with 2 pairs of spines.....*Gasteracantha tetracantha*
   Abdomen with 3 pairs of spines.....*Gasteracantha cancriformis*
3. Abdomen with 2 pairs of spines, posterior pair very long, sharp and divergent.....*Micrathena armata*
   Abdomen with 3 pairs of spines, all relatively short, 2 posterior pairs, swollen, with sharp tips, subparallel.....*Micrathena similis* sp. n.

Genus Gasteracantha Sundevall 1833

Gasteracantha cancriformis (Linn.)

Aranea cancriformis Linnaeus, 1758, p. 624. "♀ Jamaica"
Gasteracantha hexacantha Banks, 1903, p. 341.
Gasteracantha sexserrata Banks, 1903, p. 341.

A common spider found in all parts of Haiti and the Dominican Republic.

Gasteracantha tetracantha (Linn.)

Aranea tetracantha Linnaeus, 1767, p. 1037. "♀ St. Thomas"
Gasteracantha hilaris Banks, 1903, p. 341.

3 ♀ Haiti; Port-au-Prince, (Crew), Banks Coll.

Genus Micrathena Sundevall 1833

Micrathena militaris (Fabr.)

Aranea militaris Fabricius, 1775, p. 434, [♀] "in America"
Aranea armata Olivier, 1791, 4, p. 202. "no locality"
Plectana armata Walckenaer, 1841, 2, p. 179, pl. 22, fig. 1. "♀ Nouveau-Monde — Archipel occid. — Saint Dominque."
nec *Micrathena sexspinosa* Reimoser, 1919, p. 126.

This species must be very common on the island from the number found by collectors. Walckenaer figures a female under the name *Plectana armata*. The anterior pair of spines are about one-third from the base and are sharp, black, vertical, close together and so little divergent that they are almost parallel. The posterior spines are much longer and are strongly divergent. In a few specimens there is a third pair of spines on the lateral margins midway between the anterior and posterior pairs. These are short and little more than cusps in most specimens.

Reimoser in his revision of the genus, places *Plectana armata* Walckenaer as a synonym of *Micrathena sexspinosa* Hahn. This is an error as in the latter species, the posterior spines are thick, not sharply pointed, only a little divergent, and the first and second pairs of spines are about subequal and the middle pair of spines is not on the margin. The figure of the epigynum also shows that the middle section is broad.

Micrathena militaris is probably confined to the islands of the Caribbean. Petrunkevitch reports it from the Virgin Islands and Puerto Rico and it is not uncommon in Cuba. Specimens are in the museum collection from at least a dozen localities in Hispaniola.

Micrathena similis spec. nov.

Figures 8, 43, 44

Female. Length, 5.0 mm., ceph. 2.0 mm., abd. 4.0 mm. long, 4.0 mm. wide at posterior margin.

Cephalothorax pale brown, cephalic portion fairly high, thoracic groove punctiform, each side on thoracic portion, midway between groove and margin, three small depressions; *eyes* in three groups, lateral eyes subequal, touching and on extreme margin, quadrangle of median eyes higher than wide, slightly narrower in front, p.m.e. a little larger than a.m.e., and separated by less than a diameter, a.m.e. separated by a scant diameter; *clypeus* almost wanting below a.m.e. and below lateral eyes equal to more than a diameter of a.m.e.; *mandibles* brown, vertical, no boss, three teeth on inferior margin of fang groove; *labium* wider than long, tip rounded; *maxillae* twice as long as labium, sides parallel; *sternum* dark brown, iridescent, strongly convex, pentagonal, with sides almost parallel, as wide as long with a distinct swelling opposite the first three pairs of coxae; *abdomen* as long as wide, much narrowed at base, with three pairs of spines, basal pair small, with blunt tips, extending far over cephalothorax, other two pairs of spines at posterior end, one above the other, distal pair slightly larger, rather short, with sharp points, sequilla best seen in figure, the two pairs of muscle spots form a quadrangle longer than wide, height of abdomen above spinnerets, two-thirds length of abdomen, sides creased, dorsum pale with sides and distal area black, venter black; *legs*, spineless and rather short; *epigynum*, area wider than long, a small median finger protrudes from plane of abdomen, with tip colorless and much narrowed, each side above fold are circular openings.

Holotype ♀ Dom. Rep.; Puerto Plata, 30 August 1938, (Darlington)

Paratype ♀ Dom. Rep.; Mt. Diego de Ocampo, north range, 3,000–4,000 feet, July 1938, (Darlington)

Micrathena similis is closely related to *M. cubana* (Banks). Both have three pairs of spines in similar positions, but in *cubana* the two posterior pairs of spines are not parallel, the spines are much sharper and the abdomen usually has a large dark median spot which is lacking in *similis*. The epigynums are quite unlike. Both species have a punctiform thoracic groove with the three pairs of depressions each side on the thoracic portion and a pentagonal sternum as wide as long.

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PLATES

PLATE 1

PLATE 1

Fig. 1. *Aranea*(?) *crewi* (Banks); right palpus, retrolateral view.
Fig. 2. *Aranea*(?) *hispaniola* Bryant; epigynum.
Fig. 3. *Aranea*(?) *crewi* (Banks); right palpus, prolateral view.
Fig. 4. *Eustala perdita* Bryant; epigynum.
Fig. 5. *Eustala bisetosa* Bryant; left palpus, prolateral view.
Fig. 6. *Eustala bisetosa* Bryant; epigynum.
Fig. 7. *Eustala vegeta* (Keys.); left palpus, prolateral view.
Fig. 8. *Micrathena similis* Bryant; epigynum, lateral view.
Fig. 9. *Eustala perdita* Bryant; left palpus, prolateral view.
Fig. 10. *Drexelia minor* Bryant; epigynum.
Fig. 11. *Eustala delasmata* Bryant; left palpus, prolateral view.

cl. = clavis; emb. = embolus; para. = paracymbium; unc. = unca.

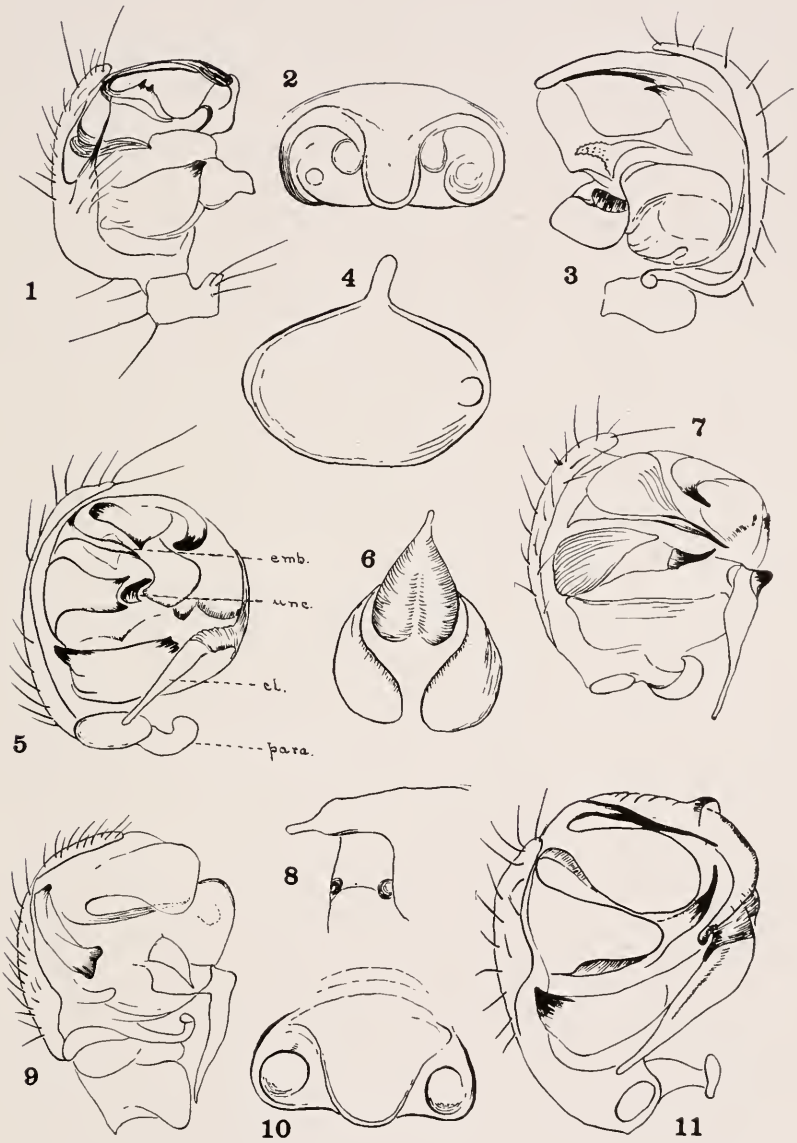
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PLATE 2

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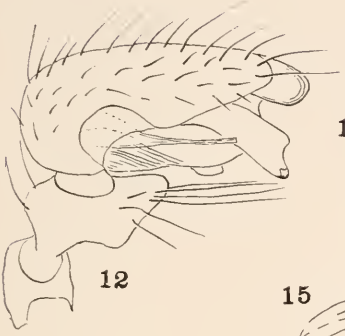
Fig. 12. *Metazygia manni* Bryant; left palpus, prolateral view.
Fig. 13. *Metazygia manni* Bryant; left mandible, front view.
Fig. 14. *Parawixia darlingtoni* Bryant; left palpus, prolateral view.
Fig. 15. *Metargyra maculata* Bryant; epigynum.
Fig. 16. *Parawixia darlingtoni* Bryant; paracymbium.
Fig. 17. *Mangora striatipes* Bryant; left palpus, prolateral view.
Fig. 18. *Mangora striatipes* Bryant; epigynum.
Fig. 19. *Neosconella parva* Bryant; epigynum.
Fig. 20. *Metepeira inerma* Bryant; epigynum.
Fig. 21. *Parawixia darlingtoni* Bryant epigynum.
Fig. 22. *Meta* (?) *blanda* Bryant; epigynum.
Fig. 23. *Metazygia manni* Bryant; epigynum.
Fig. 24 *Neosconella parva* Bryant; epigynum, lateral view.
Fig. 25. *Meta*(?) *hotteiensis* Bryant; epigynum.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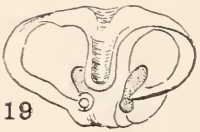
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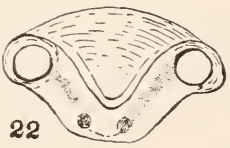
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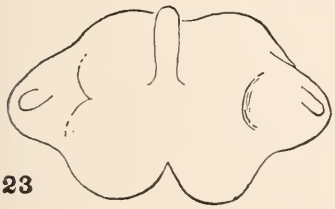
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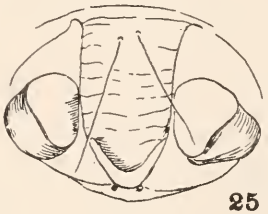
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PLATE 3

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Fig. 26. *Pseudometa cornuta* Bryant; left palpus, ventral view.
Fig. 27. *Pseudometa cornuta* Bryant; epigynum.
Fig. 28. *Pseudometa cornuta* Bryant; left palpus, dorsal view.
Fig. 29. *Pseudometa conspersa* Bryant; epigynum.
Fig. 30. *Pseudometa obscura* Bryant; epigynum.
Fig. 31. *Antillognatha lucida* Bryant; left palpus, lateral view.
Fig. 32. *Pseudometa linguiformis* (Frang.); epigynum.
Fig. 33. *Agriognatha rucilla* Bryant; left palpus, ventral view.
Fig. 34. *Agriognatha espanola* Bryant; left palpus, lateral view.
Fig. 35. *Agriognatha argyra* Bryant; left palpus, lateral view.

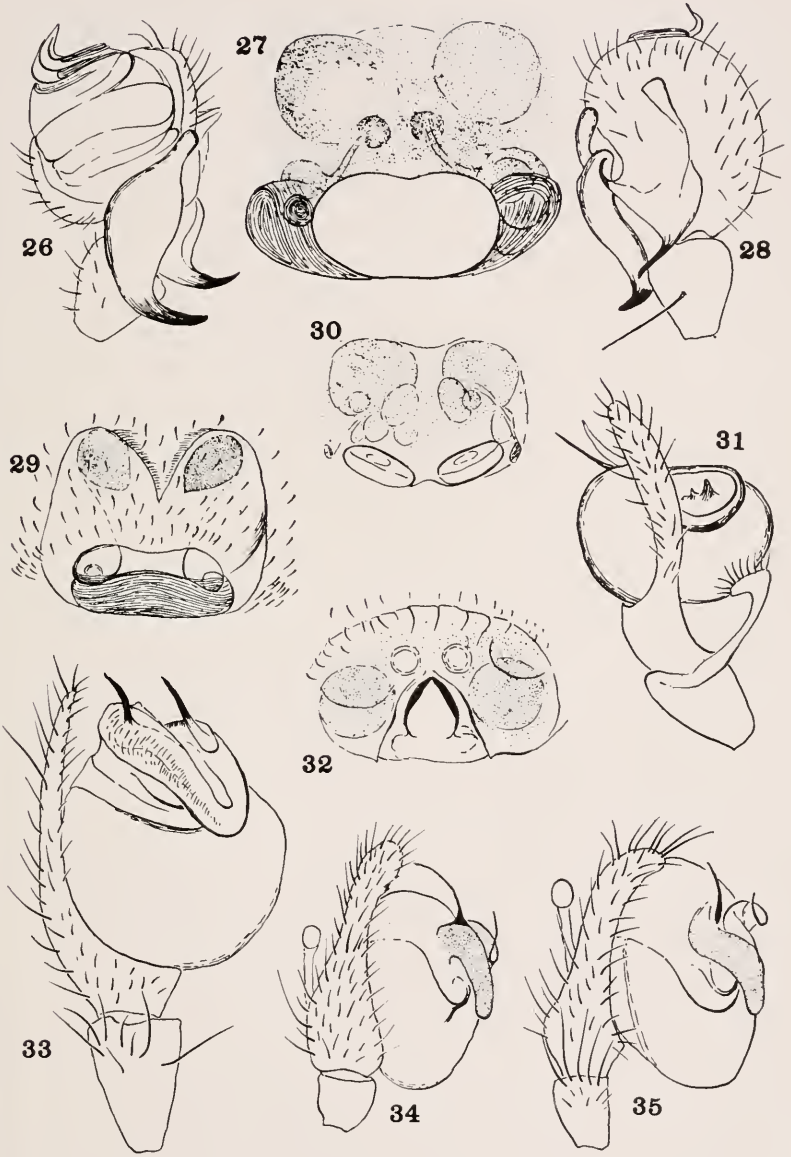
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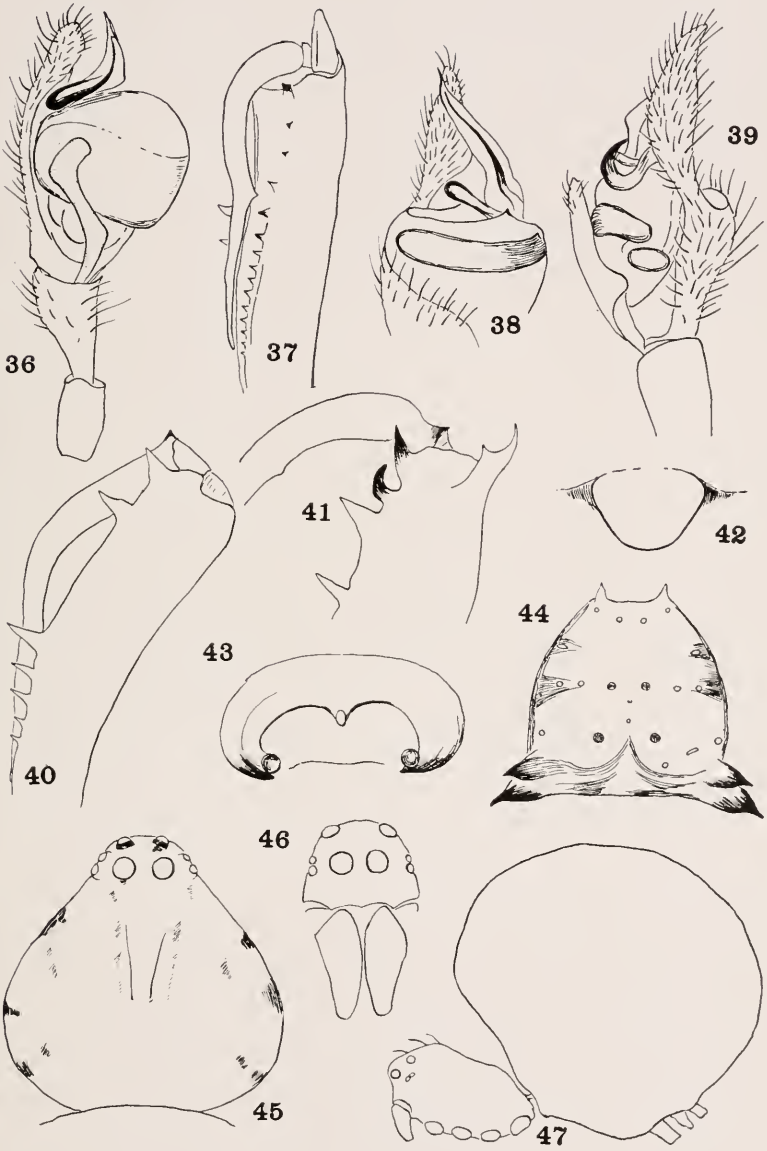
PLATE 4

PLATE 4

Fig. 36. *Hispanognatha guttata* Bryant; left palpus, lateral view.
Fig. 37. *Tetragnatha haitiensis* Bryant; female, left mandible, ventral view.
Fig. 38. *Tetragnatha festina* Bryant; left palpus, embolus.
Fig. 39. *Tetragnatha festina* Bryant; left palpus, lateral view.
Fig. 40. *Tetragnatha festina* Bryant; female, right mandible, dorsal view.
Fig. 41. *Tetragnatha festina* Bryant; male, right mandible, dorsal view.
Fig. 42. *Allototua guttata* Bryant; epigynum.
Fig. 43. *Micrathena similis* Bryant; epigynum.
Fig. 44. *Micrathena similis* Bryant; female, dorsum.
Fig. 45. *Allototua guttata* Bryant; female, cephalothorax.
Fig. 46. *Ogulnius fulvus* Bryant; female, face.
Fig. 47. *Ogulnius fulvus* Bryant; female, lateral view.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Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
VOL. XCV, No. 5

A REVISION OF THE GENUS EPICAUTA IN AMERICA NORTH OF MEXICO (COLEOPTERA, MELOIDAE)

BY FLOYD G. WERNER
Biological Laboratories
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WITH SEVEN PLATES

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PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE

The BULLETIN and MEMOIRS are devoted to the publication of investigations by the Staff of the Museum or of reports by specialists upon the Museum collections or explorations.

Of the BULLETIN, Vols. I to XCIV, and Vol. XCV, No. 1, 2, 3, 4 and 5 have appeared and of the MEMOIRS, Vol. I to LV.

These publications are issued in numbers at irregular intervals. Each number of the Bulletin and of the Memoirs is sold separately. A price list of the publications of the Museum will be sent upon application to the Director of the Museum of Comparative Zoölogy, Cambridge, Massachusetts.

Publication of Memoirs ceased with Vol. LV.

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No. 5.—*A Revision of the Genus Epicauta in Ameriea North of Mexieo*[1]

By Floyd G. Werner

INTRODUCTION

Since the time of C. V. Riley, every textbook of entomology has devoted space to one or more species of *Epicauta*, as an example of hypermetamorphosis, and as a garden pest. Every beginner knows *Epicauta marginata*, the "margined blister-beetle" and its grey form *cinerea*. It seems amazing that nobody has ever pointed out that the margined blister-beetle of potatoes does not have a grey form over most of its range. True, in most localities one may collect margined beetles with a few grey individuals among them but they occur on *Clematis*, not potatoes, and are actually of a species distinct from that found on potatoes. Over the western part of the United States and in Mexico, five species have been known as *cinerea*. Yet all are perfectly distinct and one is only remotely related to it. Coming back to *marginata*, we find that Fabricius used the name for an insect from the Cape of Good Hope, later for a North American species.

Oversights like these do not speak well for the work of field men and collectors alike. Perfectly distinct species are confused in the field and in the collections because superficially they resemble each other. Everyone seems to assume that since the insect is large and common it is well known.

This revision is offered to the field entomologist as a preliminary work. I have attempted to straighten out the nomenclatorial problems and to define the known species as well as I could from museum material. It is my hope that it will form a basis for a more exact knowledge of this economically important group.

ACKNOWLEDGEMENTS

Originally this revision was presented as a thesis for honors at graduation at Harvard College, the work being done under the supervision of Dr. Frank M. Carpenter. Much of the work then and later has been done in the M. C. Z. and with the Museum collection. Mr. Banks and Dr. Darlington have been extremely helpful in extending favors and giving advice. During the progress of the work, it was discovered that Dr. William H. Anderson of the National Museum had been working up a revision also. Dr. Muesebeck and he decided to let me finish the job. Dr. Anderson and Mr. H. S. Barber of the National Museum

[1] Published with the aid of a special gift from Mr. George R. Agassiz.

generously contributed their notes and observations and gave me free access to the collections. During the course of the work, the following museums have been visited, the collections and types examined: U. S. National Museum, Academy of Natural Sciences at Philadelphia, American Museum of Natural History, Field Museum of Natural History, Cornell University collection, Carnegie Museum, Purdue University and the collection of W. S. Blatchley, and Ohio State College. The curators have everywhere been extremely free with favors. In addition, the collections of Colorado State College and of the Iowa Insect Survey were sent for examination.

DISCUSSION OF CHARACTERS USED

The tribe Epicautini includes all of the Meloidae with a patch of cinerous pubescence on the inside of the anterior femora. All of our species have this patch in a shallow excavation. In a few it extends the length of the femur.

The relationship of the species and delimitation of genera within the tribe is somewhat complicated. On the basis of one character, the groups form one way; on another, they form another way. The only group the author has been able to delimit satisfactorily is the genus *Pleuropompha*, with two North American species. It has strongly raised costae on the elytra, scale-like pubescence in part and has several of the intermediate segments of the antennae, not the basic, elongated and modified in the male.

Henous and *Nomaspis* were originally described as being related to *Meloe* because they are wingless and the elytra are shortened. They have a cinereous patch on the anterior femora and fit into *Epicauta* very well, in the group with slender, tapered antennae. Winglessness is not a sufficient character for separating them in my estimation.

Causima includes a single South American species, *vidua*, which differs from *Epicauta* only in being heavier and having the elytra slightly shortened. If the genus were to be maintained, a whole series of intermediate species would have to be taken into account. At best it would be a separation on a very trivial character.

Isopentra was described as an Old World genus and would include the species with filiform to ensiform antennae and with two spurs on the anterior tibiae of the male. It is hard to maintain because one must arbitrarily limit it. Many species have antennae on the borderline between slightly broadened and ensiform. Some of these have ensiform antennae in the male and not in the female. The Old World

group is uniform but no good characters appear to separate it from such species as *oregona* and *ensiformis* in our fauna.

Gnathospasta was described to include one species, *mimetica*, with deeply incised labrum, elongated mandibles and modified maxillae. One other Mexican species was added to it. In this paper several species are described, which make it difficult to maintain the genus. *Calcarata* has the mouth characters but falls into a very different group on the basis of the antennae. *Mimetica* has the antennae slender and tapered, with the first segment somewhat elongated and excavated externally at the tip. *Uniforma* and *alpina* have antennae approaching *mimetica* and also mouthparts, especially *alpina*. *Calcarata* has heavy, uniform antennae and would fall into Group C of Horn's tables. So *Gnathospasta* can be sunk under *Epicauta* on the basis of both connecting species and duplications of diagnostic characters in an unrelated species.

The genus *Macrobasis*, defined as including all species with the second segment of the antennae not shortened, is a very heterogeneous group. It includes almost all of the species with the first segment of the antennae elongated in the male. But not all. *Longicollis*, *lincaris* and *maculifera* have the first segment elongated in the male but have a short second segment. An arbitrary division is made between *tenella* in *Macrobasis* and *merkeliana* in *Epicauta*, two species otherwise closely related. *Segmenta*, *immaculata* and some others do not have the first segment elongated in the male.

Apterospasta was created by Le Conte to include the form of *segmenta* with short wings and somewhat bulbous elytra, which he called *valida*. It seems to be just a form of a species that would be placed in *Macrobasis* and the genus has long been sunk under it.

It is inconvenient to have a genus very large and not subdivided, especially when it is World-wide in distribution as is *Epicauta*. Horn divided the North American species of *Epicauta* proper into three groups, "A" which included the species with fairly short uniform antennae, "B" which contained species with somewhat tapered antennae and modified heads, "C" which contained the species with filiform to ensiform antennae. Group "C" would contain all of the other genera here sunk under *Epicauta*. It also contains all of the species of *Epicauta* as now constituted outside of North America.

Groups "A" and "B" stand as recognizable units. Group "C" is intimately associated with *Macrobasis* and the rest of the old genera which fall into the Epicautini. Division on the basis of antennal characters is not natural, as pointed out under the discussion of *Macrobasis*.

The presence of one spur or two spurs on the anterior tibiae of the male is one possibility for division. Some species of the old group "C", some of *Macrobasis* with straight first antennal segment in the male and some with curved first antennal segment fall into each group. There is no appearance of homogeneity in either.

Late in my work on the group I found a character which seems to follow a more natural grouping of species than has as yet emerged. On the inner side of the apex of the posterior tibiae of the male, there is a short row of stout teeth.

They occur in all of the *Macrobasis* group with curved first antennal segment in the male except *longicollis, albida* and *texana*. In addition they occur in the species of *Epicauta* with a suggestion of the curved first segment: *uniforma, alpina* and *mimetica*. Beside that they occur in *alastor* and *ingrata* in *Epicauta* and in *lauta* and *tenella* among the species formerly included as borderline species in *Macrobasis*. They occur in *polingi, liebecki* and *arizonica*, which have a straight first segment in the male. They do not occur in the rest of the species of group "C", in *immaculata* and *segmenta* of the borderline species of *Macrobasis*, in the species of *Macrobasis* with straight first antennal segment in the male, except for the *polingi* group, nor in *longicollis, albida* and *texana* with curved first antennal segment.

Following is an attempt to group the species on the basis of the characters mentioned. These groups seem to represent natural units.

A. Posterior tibiae of male without apical teeth.
  B. Antennae tapering toward apex.
    C. Head or legs not modified.
      D. Anterior tibiae of male with two spurs.
        E. Second segment of antennae not more than half as long as third (*corvina, funebris, pensylvanica, conferta, parva, fallax, albolineata, brunnea, cinerea, fissilabris, solani, floridensis, ruidosana, punctipennis, balli, oregona, ensiformis, stuarti, lemniscata, vittata, occidentalis.*)
        EE. Second segment of antennae more than half as long as third.
          F. First segment of male antennae straight. (*immaculata, segmenta, sublineata, flavocinerca, fabricii, murina, subglabra, tenuis, excors, tenuilineata, (languida?).*)
          FF. First segment of male antennae curved (*albida, texana, longicollis*).
      DD. Anterior tibiae of male with one spur. (*abadona, insignis, nigritarsis, crassitarsis, pedalis, maculata, normalis, nogales, phoenix, pardalis, andersoni, magnomaculata, ventralis*).

CC. Pronotum with a single median tubercle (*excavatifrons*).

CCC. Head usually modified. Pubescence usually short and dense. Some species have anterior lateral black spots on the abdominal sternites. (*caviceps, impressifrons, rileyi, straba, rehni, wheeleri, diversipubescens, aspera*).

CCCC. Middle and posterior legs of male flat behind and curved, with fringes of long pubescence. (*californica, alphonsii*).

BB. Antennae uniform or almost uniform in thickness, rather short (*ferruginea, fortis, strigosa, bakesii, callosa, sericans, atrata, pruinosa, immerita, piceiventris, sanguinicollis, puncticollis, oblita, barberi, kansana, calcarata, heterodera*).

AA. Posterior tibiae of male with a row of stout apical teeth. Fig. 8.

G. Anterior tibiae of male with two spurs.

H. First segment of antennae straight (*ingrata, tenella, merkeliana*).

HH. First segment of antennae with an external apical excavation, especially in the male. (*uniforma, alpina, mimetica*).

GG. Anterior tibiae of male with one spur (none in *alastor*).

I. First segment of anterior tarsi of male at least as long as second, straight. First segment of male antennae large, curved. (*purpurea, torsa, atrivittata*).

II. First segment of anterior tarsi of male short, contorted.

J. First segment of antennae not modified in male (*alastor.*)

JJ. First segment of antennae elongated and modified in male.

K. First segment of male antennae straight, not excavated (*lauta, polingi, arizonica, liebecki*).

KK. First segment of male antennae curved and excavated externally near the tip. (*ochrea, gissleri, parkeri, virgulata, linearis, maculifera.*)

Tribe Epicautini Denier, 1935, Rev. de la Soc. Ent. Arg. **7**:151

Epicauta Dejean

Epicauta Dejean, 1833, Catalogue des Coléoptères:224. Genotype: *Lytta erythrocephala* Pallas, 1776, Reise russ. Reich **1** App.:14 (new designation to concur with designation as genotype of *Epicauta* Redtenbacher, 1845, Gatt. deutsch. Käfer-Fauna:133 by Wellman, 1910, Canadian Entomologist **42**:396.)

Causima Dejean, 1837, Catalogue des Coléoptères, 3rd Ed.:248. Genotype: *Cantharis vidua* Klug, 1825. (new designation to concur with designation as genotype of *Causima* Lacordaire, 1859 by Wellman, 1910, Canadian Entomologist **42**:394.)

Henous Haldeman, 1852, Stansbury's Expl. and Surv. Great Salt L. Valley: 377. Genotype: *Henous techanus* Haldeman, *loc. cit.* (monobasic) = *Meloe confertus* Say, 1824, Journ. Acad. Nat. Sci. Phila. **3**:281.

Isopentra Mulsant, 1858, Opusc. Ent. **8**:106. Genotype: *Lytta megalocephala* Gebler, 1817, designated by Wellman, 1910, Canadian Entomologist **42**:396.

Macrobasis Le Conte, 1858, Journ. Acad. Nat. Sci. Phila. (2) **4**:39. Genotype: *Lytta albida* Say, 1823, Journ. Acad. Nat. Sci. Phila. **3**:305, designated by Wellman, 1910, Canadian Entomologist **42**:396.

Apterospasta Le Conte, 1858, Journ. Acad. Nat. Sci. Phila. (2) **4**:39. Genotype: *Apterospasta valida* Le Conte, *loc. cit.* (monobasic).

Nomaspis Le Conte, 1866, Smiths. Misc. Coll. **6** no. 167, 2nd Ed.:156. Genotype: *Meloe parvus* Haldeman, 1852, Stansbury's Expl. and Surv. Great Salt L. Valley: 377, (monobasic.)

Gnathospasta Horn, 1875, Trans. Am. Ent. Soc. **5**:154. Genotype: *Gnathospasta mimetica* Horn, *loc. cit.* (monobasic).

Key to the Epicautini of North America, North of Mexico

Elytra with several strongly raised costae. Third to fifth antennal segments somewhat elongated. Body with some scale-like hairs.
Genus *Pleuropompha* Le Conte

Elytra without raised costae. Third to fifth antennal segments not elongated. Pubescence not scale-like. Genus *Epicauta* Dejean

Genus *Pleuropompha* Le Conte

With four raised costae on each elytron. *costata* (Le Conte)
With three raised costae on each elytron. *tricostata* Werner

Genus *Epicauta* Dejean

1. Second segment of antennae half as long as third or shorter. 2
   Second segment of antennae two-thirds as long as third or longer . 86
2. (1) Pubescence cinereous, denuded in a number of spots, at least on the elytra. 3
   Pubescence not denuded in small spots. 19
3. (2) Anterior tibiae with a single strong, incurved spur (♂ ♂) 4
   Anterior tibiae with two slender, spiniform spurs 12
4. (3) With a broad black mark apically on the abdominal sternites. 5
   Without a median mark on the abdominal sternites 6

5. (4) 18 mm. or longer. Spots on elytra very irregular in size, some large but not confluent. A pair of small denuded callosities on the pronotum. California ..... *magnomaculata* Martin ♂

    15 mm. or less. Spots on elytra small, quite regular in size. Pronotum without callosities ..... **ventralis** sp. n. ♂

6. (4) One or both pairs of palpi expanded 7

    Palpi not expanded 9

7. (6) Both pairs of palpi very broad and flat. Spots on body large and usually partly confluent ..... *andersoni* Werner ♂

    Only maxillary palpi expanded 8

8. (7) Maxillary palpi with last segment almost orbicular. Elytra not truncate ..... *maculata* (Say) ♂

    Maxillary palpi broad but last segment triangular. Elytra truncate. Nogales and Tucson, Arizona ..... *nogales* Werner ♂

9. (6) First segment of anterior tarsi narrow at base, without pad except on apical fourth ..... *normalis* Werner ♂

    First segment of anterior tarsi with pad extending almost its full length 10

10. (9) Spots very large, confluent, shiny. Head with a number of deep punctures ..... *pardalis* Le Conte ♂

    Spots smaller. Head without deep punctures 11

11. (10) Spots on elytra fairly large, on rest of body small. Elytra swollen toward the apex, complete. Phoenix, Arizona ..... *phoenix* Werner ♂

    Spots on elytra small. Elytra truncate, exposing two or three abdominal tergites. Maxillary palpi expanded, but not conspicuously. Nogales and Tucson, Arizona ..... *nogales* Werner ♂

12. (3) Elytra brown, with small denuded spots. Rest of body black, without spots ..... *punctipennis* Werner

    Elytra of same color as rest of body 13

13. (12) Pubescence short and fairly sparse, exposing surface. Denuded spots small. Antennae ensiform, especially in the male, very slender at apex. Fig. 16 ..... *oregona* Horn

    Pubescence dense, obscuring surface. Antennae not very slender at apex 14

14. (13) Abdominal sternites with anterior lateral black spot 15

    Abdominal sternites without anterior lateral black spot 16

15. (14) 18 mm. or longer. Spots on elytra very irregular in size, some large but not confluent. A pair of denuded callosities on pronotum. California ..... *magnomaculata* Martin ♀

    15 mm. or less. Spots on elytra smaller, quite regular in size. No callosities on pronotum. Nebraska ..... **ventralis** sp. n. ♀

16. (14) Spots small to medium, not confluent 17

    Spots large, in part confluent. Females of *andersoni* Werner and *pardalis* Le Conte. The former has more slender antennae. Compare with males for safe determination.

17. (16) Elytra not swollen or truncate. Spots more or less uniform over body and elytra. Females of *maculata* (Say) and *normalis* Werner. Associate with males from same locality.
Elytra swollen or truncate. Arizona 18
18. (17) Elytra swollen behind. Spots on elytra large, on body small. Phoenix, Arizona ..... *phoenix* Werner ♀
Elytra truncate, exposing two or three abdominal tergites. Spots small. Nogales and Tucson, Arizona ..... *nogales* Werner ♀
19. (2) Elytra with one or more vittae, either structural or formed by denser pubescence, or by differently colored pubescence 20
Elytra without vittae, even indistinct 31
20. (19) Vittae marked on elytra as well as in pubescence 21
Vittae marked in pubescence only 24
21. (20) Outer vitta very narrow, not over half as broad as the one next to it ..... *abadona* Skinner
Outer vitta at least as broad as one next to it 22
22. (21) Outer edge of anterior tibiae and tarsi smooth, denuded, shiny. Antennae flattened and broadened toward the middle. Fig. 10.
occidentalis Werner
Anterior tibiae and tarsi not shiny, moderately densely pubescent. Antennae not broadened. Fig. 9 23
23. (22) Outer two vittae of elytra fused or partly fused, at least in some specimens of a series. Northern and central states ..... *vittata* (Fab.)
Outer two vittae never fused or partly fused. Southern states, extending north to Nebraska west of the Mississippi... *lemniscata* (Fab.)
24. (20) Head and pronotum rufous. Elytra black. Vitta formed by denser cinereous pubescence ..... *sanguinicollis* Horn
Head and pronotum not both rufous 25
25. (24) Head rufous. Pronotum black or dark brown. Vittae formed by darker pubescence. Fig 18 ..... *atrata* (Fab.) in part
Head and pronotum of same color 26
26. (25) Ground color black 27
Ground color mainly tan. Pubescence denser on a single line on each elytron, producing an indistinct vitta 28
27. (25) Three white lines on each elytron. Southwestern states.
albolineata (Dugès)
Pubescence cinereous to tan with two dark brown or black vittae. Gulf and, rarely, Atlantic states ..... *strigosa* (Gyll.)
28. (26) With scutellar and humeral black or dark brown spot on elytra. First segment of male antennae elongated, curved, excavated externally at the apex. Fig. 53 ..... *virgulata* (Le Conte)
No scutellar or humeral spot 29
29. (28) 14 mm. or longer. Narrower than the following two species. Antetior tibiae of male without trace of spur. Fig. 12, 13 ..... *alastor* Skinner
12 mm. or less. Moderately stout species 30

30. (29) Ground color of head and pronotum black, of elytra tan. Elytra blackish across base, where normally covered by the base of the pronotum. Fig. 15 ..... *insignis* Horn

Ground color uniformly tan to brown, with pronotum slightly clouded. Elytra not darker across base. Mesotarsi of male much swollen, denuded ..... *crassitarsis* Maydell

31. (19) Pronotum glabrous. Rest of body densely clothed with cinereous to ferrugineous pubescence ..... *heterodera* Horn ♀

Pronotum not glabrous 32

32. (31) With a posterior median black spot on at least the third to fifth abdominal sternites 33

No spot on midline of abdominal sternites 38

33. (32) Pubescence on pronotum rufous, on rest of body cinereous. *wheeleri* Horn

Pubescence cinereous to luteous over all of body 34

34. (33) An impression on the inner margin of the eye 35

No impressions on head near the eyes 36

35. (34) With a rounded pit on the inner margin of the eye. Pubescence luteous ..... *rileyi* Horn

With a shallow impression on inner margin of the eye and with a pair of prominent occipital callosities. Pubescence cinereous. *caviceps* Horn

36. (34) Pronotum with a black spot at the anterior angles, often one at the posterior angles. Pubescence luteous ..... *diversipubescens* Maydell

No spots at angles of pronotum 37

37. (36) Brown, with cinereous pubescence. Abdominal sternites broadly black-pubescent apically. Scutellar and humeral spots of elytra connected by a dark area across the base ..... *nigritarsis* (Le Conte)

Black, with dense cinereous pubescence. Spots on abdominal sternites rounded, small. Scutellar and humeral spots not connected. *aspera* Werner

38. (32) Pubescence orange to rufous. Each elytron with two large black spots ..... *stuarti* Le Conte

Not so marked 39

39. (38) Black. Pubescence black over body, white to cinereous on the suture and margins of the elytra 40

Elytra not black with pale pubescence on the suture and margins. 44

40. (39) Eyes strongly slanted and pointed inwardly ..... *straba* Horn var. *foxi* Van Dyke

Eyes rounded inwardly 41

41. (40) Less than 10 mm. Head and pronotum shiny. Pale pubescence long and moderately sparse. Some long pale pubescence on the anterior legs. Male with middle and posterior femora curved and flattened behind, margined with long pale pubescence ..... *alphonsii* Horn

Over 10 mm. Head and pronotum not shiny. Legs not as in *alphonsii* 42

42. (41) Elytra narrowly and sharply margined with white pubescence. Pale pubescence below long and silky. Antennae slender. Southwestern mountains ..... *ruidosana* Fall

Elytra more broadly and less sharply margined. Pale pubescence below short 43

43. (42) First segment of antennae swollen, especially in the male. Intermediate segments thickened, especially in male. Posterior tibial spurs slender, spiniform. Fig. 3, 4 ..... *cinerea* (Forst.)

First segment of antennae not swollen. Intermediate segments. longer, only slightly thickened. Posterior tibial spurs broadened. Fig. 5 ..... **solani** sp. n.

44. (39) With uniform black pubescence, at least above 45

Pubescence mainly cinereous to luteous 60

45. (44) Outer spur of posterior tibiae somewhat broadened, never spiniform or sticklike 46

Outer spur of posterior tibiae spiniform or sticklike 49

46. (45) Elytra somewhat bulbous. Pronotum with a V-shaped notch in the middle of the base. Scutellum very narrow. Wings absent. *conferta* (Say)

Not so 47

47. (46) Inner spur of anterior tibiae noticeably longer and stouter than the outer. Antennae slender ..... *funebris* Horn

Inner spur of anterior tibiae not stouter than the outer 48

48. (47) Visible portion of scutellum very small. Second segment of antennae moderately slender. Antennae tapering toward apex. Fig 14. *pensylvanica* (DeG.)

Visible portion of scutellum normal in size. Second segment of antennae fairly stout, with longer pubescence. Antennae not tapering noticeably toward apex. Head black or red. Fig. 18 ..... *atrata* (Fab.)

49. (45) Eyes produced obliquely inward in an acute angle ..... *straba* Horn

Eyes rounded inwardly 50

50. (49) Antennae flattened, strongly ensiform. Entirely black. *ensiformis* Werner

Antennae not strongly ensiform 51

51. (50) Pubescence, at least in part, erect, long and silky 52

Pubescence short, recumbent, sometimes very sparse 57

52. (51) Some of pubescence on femora white ..... *californica* Werner

All of pubescence on legs, except for the characteristic cinereous patch on the anterior femora, black 53

53. (52) Antennae very slender apically ..... *fallax* Horn

Antennae almost uniform in thickness or thickened apically, or slightly more slender apically 54

54. (53) Tarsal claws curved from base. Head and pronotum shiny, with scattered deep punctures ..... *barberi* Werner

Tarsal claws straight for the basal three-fourths 55

55. (54) Antennae more slender toward apex than at the middle. Fig. 23. *oblita* (Le Conte)
Antennae slightly thickened apically, with the apical segments distinctly longer than broad 56
56. (55) Tarsi of normal thickness. Long pubescence sparse to very dense. California to North Dakota. Fig. 22 . . . . . *puncticollis* (Mann.)
Tarsi very slender. With only a few scattered long hairs. Kansas. *kansana* Werner
57. (51) Pubescence almost absent above, invisible macroscopically 58
Pubescence visible above, quite dense 59
58. (57) Elytra short, truncate, leaving several abdominal tergites exposed. Shiny, with scattered large punctures . . . . . *parva* (Hald.)
Elytra entire. Punctures small to medium . . . . *picciventris* Maydell
59. (57) Small to medium in size. First segment of antennae stout. Antennae thickened toward middle. Lake Superior to Hudson's Bay. Fig. 4, 5. *fissilabris* (Le Conte)
Large. First segment of antennae not stout. Antennae not thickened toward middle. Texas and Great Plains . . . . . *corvina* (Le Conte)
60. (44) With a tubercle on middle of pronotum . . . . . *excavatifrons* Maydell
No tubercle on middle of pronotum 61
61. (60) Tibial spurs all heavy, curved, blunt . . . . . *calcarata* Werner
Tibial spurs of at least anterior and middle legs slender, spiniform. 62
62. (61) Body color black, legs luteous. Pubescence sparse 63
Not so 64
63. (62) Labrum not deeply excised. Mandibles normal. Antennae ensiform in male . . . . . *pedalis* Le Conte.
Labrum excised. Mandibles long and slender . . . . . **balli** sp. n.
64. (62) With black markings at base of elytra 65
No black markings at base of elytra 72
65. (64) With dark humeral and scutellar spot 66
No scutellar and humeral spot. Black across base 68
66. (65) Spots connected across base of elytra. Dark. Abdominal sternites with black pubescence across apices . . . . . *nigritarsis* Le Conte
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Epicauta abadona Skinner

Epicauta abadona Skinner, 1904, Entomological News **15**:217.
Epicauta mutchleri Maydell, 1934, Trans. Am. Ent. Soc. **60**:331.
Epicauta abandona Maydell, 1934, *loc. cit* (*lapsus calami*).

Length: 9 to 16 mm. Elongate, slender. Tan, rather densely clothed with pale tan pubescence, except for a pair of narrow longitudinal

brown or black lines on the pronotum and two incomplete and a third much less distinct black vittae on the elytra. Posterior tibiae of the male with very broad spoon-shaped spurs. Maydell's *mutchleri* is based on this sexual difference.

Head subquadrate, partly denuded and shiny in the male. Median suture only feebly impressed. Eyes prominent, moderately broad. Antennae fairly long, three times as long as an anterior tibia, slender, somewhat flattened. First segment reaching to the middle of the eye, fairly stout; second two-thirds as long as the first, narrow; third about two and one-third times as long as the second; fourth and following as long as the first and gradually decreasing in thickness. Pronotum one-third longer than broad, campanuliform, with a fairly broad but shallow median longitudinal impression. Suture very faintly impressed, inconspicuous. Elytra with a narrow stripe arising near the scutellum and extending to near the apex, another of equal width from the humerus almost to the apex, and a third, much narrower, just outside the latter. Uniformly tannish below. Anterior tibiae of the male with a single heavy, incurved spur. Hind tibial spurs of the male broad, flat, spoon-shaped. Hind spurs of the female also flattened but not conspicuously broadened. First segment of the anterior tarsi of the male slightly elongated but not otherwise modified.
Type: Holotype ♂ A.N.S.P. No. 8068, examined.
Type locality: Phoenix, **Arizona.**
of *mutchleri* Maydell
Type: Holotype ♂, A.M.N.H., examined.
Type locality: Phoenix, **Arizona.**
Additional localities: **Arizona:** Tucson, Avondale Ranch — Agua Fria R. **Mexico:** Mazatlan — Sinaloa. Occurs in August.

Epicauta alastor Skinner

Fig. 12, 13

Epicauta alastor Skinner, 1904, Entomological News **15**:217.

Length: 8 to 14 mm. Elongate, slender. Light to dark brown, clothed with tannish-cinereous pubescence, which is sparse but for a narrow stripe on the elytra from humerus to apex, and the margins, which are more densely pubescent. The form of pubescence of *insignis* Horn is very similar but that species is shorter and stouter, has the head and pronotum black or dark brown and has

black pubescence at the base of the elytra. *Crassitarsis* Maydell also has similar pubescence but it also is much shorter and stouter.

Head suboval. Suture fine. Eyes very large, conspicuous, quite broad. Antennae, especially in the male, subensiform; three and one-half times as long as an anterior tibia. First segment moderately stout, reaching to the middle of the eye; second half as long as the first, more slender; third and following flattened, the third two and one-half times as long as the second; fourth and following equal in length, four-fifths as long as the third. The fourth segment is the broadest, the rest gradually decreasing in breadth toward the apex. Pronotum one-third longer than broad, campanuliform, with a distinct suture and basal impressed line. Below, uniformly colored as above. Anterior tibiae of the male without any trace of a spur. Outer posterior tibial spur flattened, stick-like; the inner slender, spiniform. First segment of the anterior tarsi of the male short, contorted, but not denuded.

Type: Holotype ♂, A.N.S.P. No. 8084, examined.

Type locality: Florence, **Arizona.**

Additional localities: **Colorado:** Ft. Collins (one specimen in Colo. State College). **Texas:** Presidio. **Arizona:** Yuma, Florence Jct., Avondale Ranch — Agua Fria R., Aug. 7, 17, Texas Pass — Dragoon Mts., July 21, 17, Phoenix. **California:** Imperial Co., El Centro, Yuma.

At first sight, there seems to be a difference between the Arizona and California specimens in that the latter are darker. But Arizona specimens are sometimes dark and California specimens light.

Epicauta insignis Horn

Fig. 15

Epicauta insignis Horn, 1885, Trans. Am. Ent. Soc. **12**:110.

Length: 7 to 10 mm. Rather stout, black, elytra and legs ferrugineous. Entirely clothed with rather sparse tannish pubescence, which is a little denser on an indistinct median line and the margins of the elytra. *Crassitarsis* Maydell has a ferrugineous pronotum and a very distinct line of denser pubescence on the elytra.

Head suboval, sparsely and finely punctured, shiny. Suture distinctly impressed. Antennal calluses denuded, smooth, shiny. Eyes prominent, transverse, moderately narrow. Antennae black, two and three-fourths times as long as an anterior tibia in the male,

two and one-fourth in the female, ensiform in the male, subensiform in the female. First segment reaching two-thirds across the eye; second short, small, one-third as long as the first; third as long as the first, flattened, the broadest segment; rest a little shorter than the third, gradually narrower toward the tip, flattened. Last segment of the maxillary palpi broader in the male than in the female. Pronotum subquadrate, one-fourth longer than broad. Suture distinct but not deeply impressed. Surface as on the head. Black below; legs ferrugineous. The tips of the femora are a dark brown. Anterior tibiae of the male with a single short, incurved spur. Posterior tibial spurs flattened but not very broad, spiniform.

Type: Lectotype ♂, new designation, A.N.S.P. No. 8097, examined.

Type locality: **Arizona.**

Additional localities: **Texas**: "Tex." — Eddy Coll. **New Mexico**: Socorro Co. **Arizona**: Baboquivari Mts., Nogales, Palmerlee, Huachuca Mts.

Epicauta nigritarsis (Le Conte)

Lytta nigritarsis Le Conte, 1853, Proc. Ac. Nat. Sci. Phila. **6**:340.
Epicauta nigritarsis, Horn, 1873, Proc. Am. Phil. Soc. **13**:100.

Length: 7 to 13 mm. Tan above, with rather dense cinereous pubescence. Brown humeral and scutellar spots on the elytra, narrowly connected across the base where not normally visible. Below, mainly black, with cinereous pubescence. Legs tan, with apices of the segments brown. Easily distinguished from the other tan *Epicautae* because the head and pronotum are of the same color as the elytra.

Head subquadrate. Suture distinctly impressed, supplemented by a narrow denuded line. Antennal calluses not raised, small, denuded, shiny. Eyes rather small, narrow, transverse. The antennae are quite slender, reaching the basal third of the elytra, two and one-fourth times as long as an anterior tibia. First segment somewhat thickened, reaching two-thirds across the eye; second slender, half as long as the first; third slightly longer than the first two, slender; fourth and following two-thirds as long as the third, decreasing slightly in thickness and just perceptibly in length. Pronotum quadrate, slightly broader than long. Median suture distinct on the middle of the disc, less distinct toward the base and apex. Basal impressed line distinct but covered with

pubescence. Elytra a little broader behind than at the humerus. Margins sometimes slightly paler from the denser pubescence. Posterior border of the third to fifth abdominal sternites with black pubescence; sixth mostly black; anterior lateral margin of the fourth and fifth with a black spot. These black markings have heretofore passed unnoticed because of the dark color of the underside. Anterior tibiae of the male with a single short, usually inwardly directed spur (not two as stated by Horn, 1873). Posterior tibiae with two slender, sticklike spurs, the inner long, the outer shorter.

Type: Lectotype ♀, new designation, M. C. Z. No. 4998, examined.

Type locality: Mexican Boundary, **Texas.**

Additional localities: **Texas:** New Braunfels, Brownwood, Brownsville, Big Springs, Knipps, Del Rio, Harris Co., Dallas, Uvalde. **New Mexico:** Tucumcari. Occurs in June and July. Apparently abundant when it occurs.

Epicauta crassitarsis Maydell

Epicauta crassitarsis Maydell, 1935, Journ. Wash. Acad. Sci. **25**:72.

Length: 7 to 9 mm. Light to dark ferrugineous, clothed with tannish-cinereous pubescence, moderately densely but for the more densely clothed margins of the elytra. Short and rather stout. The pronotum and the elytra are of the same color.

Head suboval, black on the front and vertex, ferrugineous behind, rather coarsely but shallowly punctured. Suture distinctly impressed, complete. Antennal calluses not denuded except for a very small area at the base of the antennae. Eyes prominent, transverse, moderately broad. Antennae moderately long, slightly flattened, tapering, reaching to the basal eighth of the elytra, two and one-half times as long as an anterior tibia, black but for the first and second segments. Middle thicker in the male than in the female. First segment short, rather stout, reaching to the middle of the eye; second small, two-fifths as long as the first; third one-fourth longer than the first; fourth the thickest segment, the fourth and following approximately as long as the first; the segments beyond the fourth decrease noticeably in thickness in the male, less so in the female. Pronotum subquadrate, one-fourth longer than broad; sides parallel for the basal four-fifths, then converging abruptly. Ferrugineous but for an obscure interrupted darker band

near the apex. Median suture and basal impressed line distinct, with a shallow median basal impression. Scutellum rather small. Elytra denuded across the base, where covered by the pronotum. Abdominal sternites darker toward the apex; or mainly darker below. Anterior tibiae of the male with a single, incurved, spiniform spur. Middle tarsi of the male strangely modified. Glabrous but for the pads. First segment stout, inflated, thicker by one-fourth than the apex of the tibia. Rest much smaller than the first, decreasing in thickness, the last not at all inflated. Posterior tibial spurs broad, flattened, slightly pointed.

Type: Holotype ♂, U.S.N.M., examined.

Type locality: Tempe, **Arizona**, Sept. 7, 1933, K. B. McKinney.

Additional records: Tempe, **Arizona**, Sept. 20, 1934, on alfalfa K. B. McKinney (U.S.N.M.).

Epicauta pedalis Le Conte

Epicauta pedalis Le Conte, 1866, Smiths. Misc. Coll. **6** no. 167, 2nd ed.: 157. Horn, 1873, Proc. Am. Phil. Soc. **13**:99.

Length: 6 to 9 mm. Black, rather sparsely clothed with cinereous pubescence. Legs bright ferrugineous. More slender than the others in this group.

Head triangular, with scattered shallow punctures. Suture finely but distinctly impressed. Antennal calluses small, denuded, shiny. Eyes moderately prominent, transverse, fairly narrow. Antennae of male ensiform, of female quite slender, reaching two-thirds the length of the elytra in the male, to the basal third in the female. First segment rather stout, reaching three-fourths across the eye; second short, half as long as the first; third almost as long as the first two together; rest subequal, two-fifths as long as the third, decreasing in thickness from the fourth. Pronotum one-fourth longer than broad, subcampanuliform. Median suture distinctly, deeply impressed. Basal impressed line also distinct but not as deep. Elytra without markings. Below, of the same color as above. Anterior tibiae of the male with a single short, incurved, spiniform spur. Anterior tarsi of male not modified. Posterior tibial spurs slender, sticklike.

Type: Lectotype ♀, new designation, M. C. Z. No. 4997, examined.

Type locality: **Lower California.**

Additional localities: **Arizona**: Tucson.

Epicauta maculata Say

Lytta maculata Say, 1823, Journ. Ac. Nat. Sci. Phila. **3**:298. Le Conte, 1853, Proc. Ac. Nat. Sci. Phila. **6**:340.
Lytta conspersa Le Conte, 1853, *loc. cit.*, *nec* Curtis, 1845.
Epicauta maculata, Horn, 1873, Proc. Am. Phil. Soc. **13**:100.

Length: 6 to 12 mm. Black, quite densely clothed with olive-cinereous to cinereous pubescence. With denuded spots of varying extent, which do not usually run together. They are generally distinct on the elytra but may be small on the head and pronotum. Male with the maxillary palpi large, flattened, the labial palpi small.

Head subquadrate. Suture distinctly impressed. Antennal calluses small, denuded, shiny. Eyes moderately prominent, quite small, transverse, fairly narrow. Maxillary palpi broad and flat in the male, the last segment being almost orbicular in outline, shiny, with very short scattered brown pubescence below. Labial palpi small. Antennae about twice as long as an anterior tibia, quite slender, tapering slightly toward the tip. First segment moderately stout, reaching half-way across the eye; second narrow, two-thirds as long as the first; third as long as the first two together; fourth and following four-fifths as long as the third, decreasing gradually in thickness. Pronotum quadrate, rather rotund. Median suture finely impressed, supplemented on the middle of the disc by a narrow denuded line. Basal impressed line distinct. Anterior tibiae of the male with a single short, stout, incurved spur. First segment of the anterior tarsi not modified in the male, with the pad extending almost its full length. Posterior tibial spurs slender, spiniform, the inner longer.

One male from Oklahoma City, Okla., in the U.S.N.M. has two spurs on the anterior tibiae, as in the female. Several cases of this sort have occurred in other species also, but they are of such rare occurrence that listing them in the key to species would only make the keys longer, adding little to their usefulness.

Type: Say's type lost. Neotype ♂, and neoparatypes in the M. C. Z.

Type locality: "Inhabits Missouri and Arkansas . . . not uncommon near the Rocky Mountains." Neotype locality: Indianola, Nebraska — A. P. Morse.

of *conspersa*. Le Conte

Type: Lectotype ♂, new designation, M. C. Z. No. 5000, examined.

Type locality: **Missouri Territory.**

Additional localities: Common from the Rockies to western Iowa and Missouri, and from North Dakota to Wickenburg and Palmerlee, Arizona and Texas. Probably extends some distance into Mexico. Occurs in June and July.

Epicauta nogales Werner

Epicauta nogales Werner, 1944, Psyche **50**:65.

Length: 7 to 9 mm. Close to *maculata* (Say). The male has the labial palpi flattened, broad but the last segment is not as broad as in the male of *maculata*. The elytra are short and broad, leaving the tips of the abdomen broadly exposed. The elytra are more separately rounded than in any of the other species in the group. The spots on the body and elytra are small. Anterior tarsi of the male not modified, the pad of the first segment extending almost its full length.

Type: Holotype ♂, M. C. Z. No. 26085, examined.

Type locality: Nogales, **Arizona.**

Additional localities: **Arizona:** Tucson. Occurs from July to September.

Epicauta normalis Werner

Epicauta normalis Werner, 1944, Psyche **50**:65.

Length: 6 to 12 mm. This species replaces *maculata* in the Rocky Mountains and westward to the Pacific, except in Arizona, where *nogales* and *phoenix* are found. The species is as variable as *maculata* as to size of spots but differs from that species in having the maxillary palpi small in the male, not shiny and by having the first segment of the anterior tarsi of the male narrow, slightly outcurved, with the pad absent from at least the basal three-fourths. More of the specimens have cinereous pubescence than in *maculata* but a few have olive-cinereous.

Type: Holotype ♂, M. C. Z. No. 26086, examined.

Type locality: Bridgeport, **California.**

Additional localities: **California:** Shasta Valley, Eagleville. **Oregon:** Echo, Burns. **Washington:** Yakima Valley. **Nevada:** Paymaster Canon — Lone Mt. — Esmeralda Co., Reno. **Idaho:** Ruhl. **Wyoming:** Green River City, Laramie. **Montana:** Helena. **Utah:** Fillmore, American Fork, Duchesne Co., Jordan R., Provo, Indianola, Ogden. **Colorado:** Manitou, La Veta, Colorado Springs, Windsor, Ft. Collins. **Arizona:** Chiricahua Mts., Huachuca Mts.

Epicauta phoenix Werner

Epicauta phoenix Werner, 1944, Psyche **50**:66.

Length: 7 to 12 mm. Close to *maculata* (Say). Easily distinguished from the others of the group by the more convex form of the elytra, especially toward the apex, the slender antennae and by the small palpi of the male. The antennae tend to be shorter than in the others. The spots on the elytra are moderately large, but distinct from each other. The spots on the head and pronotum are small and indistinct. Below, they are small, but larger than on the head and pronotum.

Type: Holotype ♂, M. C. Z. No. 26070, examined.

Type locality: Phoenix, **Arizona**. Apparently fairly abundant at the type locality.

Epicauta pardalis Le Conte

Epicauta pardalis Le Conte, 1866, Smith. Misc. Coll. **6** no. 167, 2nd ed.: 157; Horn, 1873, Proc. Am. Phil. Soc. **13**:99. Champion, 1892, Biol. Cent.-Am. Coleop. **4** pt 2:414.

Length: 7 to 12 mm. Black, shiny, quite densely clothed with cinereous pubescence except for fairly large round denuded spots, which are in part confluent. These spots are very smooth and shiny with only a few very small punctures. Differs from *andersoni* Werner by its thicker antennae and by the small palpi of the male.

Head triangular. Suture distinctly impressed. Antennal calluses small, denuded, shiny. Eyes rather small, transverse, quite narrow. Neither pair of palpi enlarged in the male. Antennae quite slender but not as slender as in *andersoni*, reaching to the basal eighth of the elytra, twice as long as an anterior tibia. First segment rather stout, reaching to the middle of the eye; second half as long as the first, small; third just shorter than the first; first three segments with some cinereous pubescence behind; fourth to last three-fifths as long as third, gradually tapering from the fourth. Pronotum as broad as long. Sides parallel for the basal three-fourths, then converging abruptly. Anterior tibiae of male with a single short, incurved spur. Male anterior tarsi with the first segment a little broader than in the female but not otherwise modified. Inner spur of posterior tibiae quite long, spiniform; outer shorter, flattened, sticklike.

Type: Lectotype ♀, new designation, M. C. Z. No. 4999, examined.

Type locality: Valley of the Gila.

Additional localities: **Arizona:** Ft. Grant, Tucson. **New Mexico:** Silver City, Faywood. **Texas:** Marfa. **Coahuila:** Saltillo. **Durango:** Descubridora.

Epicauta andersoni Werner

Epicauta andersoni Werner, 1944, Psyche **50**:66.

Length: 7 to 11 mm. Practically identical with *pardalis* Lec., but the differences are constant. The antennae are more slender than in that species, but both must be seen at the same time when this character is used. The male palpi provide the main difference. Both pairs are enlarged, flattened, shiny below, with scattered punctures. The last segment of the labial palpi is almost circular in outline.

Type: Holotype ♂, U.S.N.M., examined.

Type locality: Gallo Springs, **New Mexico.**

Additional localities: **Arizona:** Flagstaff. **Texas:** Childress. **Kansas:** "Ks" Dietz Coll. M. C. Z. Taken in June and August. Not common.

Epicauta ventralis sp. n.

Length: 9 to 11 mm. Another of the *maculata* species. Similar to *magnomaculata* Martin in that the male has a brown mark across the abdominal sternites and a small anterior spot on the edge of the sternites. Differs from that species by its smaller size, even punctures and brown appendages. Black, elytra dark brown or black.

Head subquadrate, densely punctured, with a few small denuded spots. Median suture distinct. Antennal calluses small, denuded. Eyes fairly small, narrow, transverse. Lower part of front, clypeus and labrum dark brown. Palpi light brown, not enlarged in the male. Antennae as in *maculata* but with the first segment stouter and the pubescence on the first two segments more erect. Pubescence on first segment cinereous behind. Antennae reaching to basal third of elytra, two and one-eighth times as long as an anterior tibia. First segment moderately stout, reaching three-fourths across the eye; second slender, half as long as first; third as long as first but slender; fourth and following two-thirds as long as third, decreasing just perceptibly in thickness. Pronotum quadrate, with a well-marked median suture. Basal impressed line obscured by pubescence. Spots small. Elytra with spots

moderately large, uniform. Second to fifth abdominal sternites with a transverse brown mark. Apex of sixth brown. Legs longer than in the other maculate species, except for *magnomaculata*. Anterior tibiae of male with a short incurved spiniform spur. Male anterior tarsi as in *normalis*. Posterior tibial spurs longer and more slender than in the other maculate species.

Type: Holotype ♂, Walsenburg, **Colorado** Aug. 4, 1934, J. F. Schuett (Field Mus.). Allotype ♀, eutopotypical (F.M.N.H.). Paratypes: 4 eutopotypical (F.M.N.H.), 2 eutopotypical (M. C. Z. No. 26633).

Epicauta magnomaculata Martin

Epicauta magnomaculata Martin, 1932, Pan Pacific Ent. 8:169.

Length: 14 to 16 mm. Black, densely clothed with appressed pale cinereous pubescence except for a number of denuded spots, which are large on the elytra, small and scattered on the body. Easily distinguished from the other maculate species by the elongate, more slender form and by the possession of a pair of small denuded callosities on the pronotum. The male has large black median abdominal spots.

Head subtriangular. Suture distinct, augmented by a narrow smooth denuded area. Antennal calluses small, denuded, shiny. Surface of head densely punctured, with the intervals smooth and shiny. Eyes fairly small, transverse, excavated, unusually squarely cut on the internal margin. Antennae of quite a distinctive form. They are short, rather stout at base, and tapering to the tip; twice as long as an anterior tibia and reaching just beyond the base of the elytra. First segment moderately stout but not thickened greatly at the tip, reaching three-fourths across the eye; second two-fifths as long, quite stout; third twice as long as second; fourth three-fifths as long as the third; fifth to last slightly longer than fourth, decreasing gradually in thickness. The first four segments have some cinereous pubescence behind. Pronotum subcampanuliform, one-fourth longer than broad. Sides almost parallel for the basal four-fifths. Median suture distinct from the base three-fourths to the apex, supplemented in the middle of the disc by a narrow denuded area. Basal impressed line distinct. Scutellum cinereous-pubescent. Base of elytra black. Spots on the elytra varying in size but in all specimens examined larger and more irregular in size than in the other immaculate species. Abdominal

sternites with an anterior lateral black mark. Male with posterior median black marks. Anterior tibiae of male with a single short, incurved spur. Posterior tibial spurs flattened, sticklike, almost equal. Tips of femora, tips and inner side of tibiae, tarsi black.
Type: in Martin Coll.
Type locality: Ballart, Inyo Co., **California.** Panamint Valley.
Additional localities: Stove Pipe Well, Death Valley, **California.**

Epicauta corvina (Le Conte)

Lytta corvina Le Conte, 1858, Journ. Ac. Nat. Sci. Phila. (2) **4**:21.
Cantharis nigerrima Dugès, 1869, La Naturaleza **1**:162; 1879, *op. cit.* **4**:66.
Epicauta corvina, Horn, 1873, Proc. Am. Phil. Soc. **13**:96, 102.

Length: 13 to 24 mm. A large stout black species, with rather dense but short and closely appressed pubescence. Larger than the other black species of our fauna and distinguished from them by its slender posterior tibial spurs. Entire surface densely but finely punctured.

Head subtriangular. Suture distinct, but not conspicuous. Eyes not prominent, moderately broad, oblique. Antennae rather slender, tapering, reaching the basal fifth of the elytra and twice as long as an anterior tibia. First segment stout toward the apex, reaching two-thirds across the eye; second small, half as long; third slightly longer than first, slender; fourth and following two-thirds as long as the third, gradually decreasing in thickness. The third segment and beyond are very slightly flattened. Last segment a little over two-thirds as thick as the fourth. Pronotum subquadrate, stout, almost as broad as long. Median suture absent or extremely indistinct. Basal impressed line distinct. A midbasal impression present, distinct. There is also a pair of very indistinct longitudinal impressions on the disc, before the middle. Exposed portion of the scutellum smaller than normal. Elytra with four indistinctly raised lines. Tibial spurs all spiniform, often broken off. Male anterior tibiae not modified.
Type: Lectotype ♀, new designation, M. C. Z. No. 5097, examined.
Type locality: Valley of the Gila.
Additional localities: **Kansas:** Ellis, Grove Co., Ft. Hayes. **Colorado:** Ft. Collins. **Texas:** Alpine. **New Mexico:** Koehler. **Arizona:** Flagstaff. Occurs from July to September.

Epicauta funebris Horn

Epicauta funebris Horn, 1873, Proc. Am. Phil. Soc. **13**:102.

Length: 11 to 18 mm. Large, black, sparsely clothed with short black pubescence. Easily distinguished from *corvina* (Lec.) by its smaller size, narrower form and broad posterior tibial spurs. It could be confused with large specimens of *pensylvanica* (De. G.) but is more slender and has the inner spur of the anterior tibiae noticeably longer and stouter than the outer.

Head subquadrate. Surface rather densely and deeply punctured, with the intervals finely granulose so that the surface appears dull. Median suture distinct, continued deeper below the level of the eyes. Antennal calluses only slightly elevated, denuded, smooth. Antennae almost uniform in thickness, two and three-fourths times as long as an anterior tibia and reaching the basal fourth of the elytra. They are slightly stouter in the male than in the female. First segment moderately slender, reaching three-fourths across the eye; second slender, half as long; third almost as long as the first two; fourth three-fourths as long as the third; rest decreasing slightly in length and thickness. Pronotum subquadrate, one-fifth longer than broad. Sides parallel for the basal four-fifths, then converging abruptly. Median suture distinct but not deep. Basal impressed line distinct. The pronotum is noticeably narrower than the head or elytra. Scutellum small, as in *pensylvanica*. Anterior tibiae with two spiniform spurs in both sexes, the inner being somewhat longer and stouter than the outer, especially in the male. Anterior tarsi of male not modified. Posterior tibial spurs flattened, the outer more blunt than the inner, both moderately broad.

Type: Lectotype ♂, new designation, Horn Coll. A.N.S.P. No. 8027, examined.

Type locality: **Texas**.

Additional localities: **Kansas**: Garden City, Wichita. **Oklahoma**: Webster. **Texas**: Columbus, Victoria, Dallas. **New Mexico**: Albuquerque.

Epicauta pensylvanica (De Geer)

Fig. 14

Cantharis pensylvanica De Geer, 1775, Mem. pour servir a l'hist. des Ins. **5**:15.
Meloe nigra Woodhouse, 1800, Med. Repos. **3**:213.
Lytta pennsylvanica, Le Conte, 1853, Proc. Ac. Nat. Sci. Phila. **6**:329.
Lytta morio Le Conte, 1853, *op. cit.*: 447.
Epicauta pennsylvanica, Horn, 1873, Proc. Am. Phil. Soc. **13**:102.

Length: 6 to 12 mm. Dull black, sparsely clothed with very short black pubescence, which is not ordinarily visible macroscopically. Outer posterior tibial spur broad. Wings fully developed.

Head broadly triangular. Surface rather densely and deeply punctured, the intervals densely punctulate. Median suture fine but distinct. Antennal calluses small, smooth, shiny. Eyes moderately prominent, transverse, excavated. Antennae a little more than twice as long as an anterior tibia, reaching to the basal fifth of the elytra. First segment stout, especially in the male, reaching half way across the eye; second small, half as long; third as long as the first but more slender; fourth two-thirds as long as the third; fifth and following slightly shorter than the fourth. Segments 3–11 gradually decrease in thickness, but only slightly. The intermediate segments are thicker in the male than in the female. The last segment is half as thick as the third in the male, two-thirds in the female. Pronotum quadrate, slightly broader at the front angles. Median suture distinct, augmented by a shallow median impression. Basal impressed line distinct, deep. Visible portion of scutellum very small. The small scutellum serves to distinguish *pensylvanica* from pure black *atrata* specimens at a glance. Male anterior legs not modified. Posterior tibial spurs flattened, pointed, the outer broader. Neither is narrow enough to be called "sticklike."

Type: Present location unknown to author.

Type locality: **Pennsylvania.**

Lytta morio Le Conte

Type: Lectotype ♀, new designation, M. C. Z. No. 5098, examined.

Type locality: **Texas.**

Additional localities: From Maine to Florida, west to Montana and Texas, apparently more common in the northern portion of its range. Occurs abundantly in the fall on flowers of goldenrod (*Solidago*) and other bright Compositae. Has been recorded as damaging potatoes and beets.

Epicauta conferta (Say)

Meloe confertus Say, 1824, Journ. Acad. Nat. Sci. Phila. **3**:281.

Henous techanus Haldeman, 1852, Stans. Exp. to Gr. Salt L.: 377, pl. 9 fig. 12–14.

Henous confertus, Le Conte, 1853, Proc. Ac. Nat. Sci. Phila. **6**:330. Champion, 1892, Biol. Cent.-Am., Coleop. **4** pt. 2:368. Van Dyke, 1928, U. Calif. Publ. Ent. **4**:411, pl. 15, fig. 1.

Length: 8 to 15 mm. Black, sparsely clothed with short black pubescence, which is invisible to the unaided eye. Upper surface densely punctured. Elytra short, leaving the tip of the abdomen exposed, separately rounded. Wingless.

Head subquadrate. Punctures sparser below the level of the eyes. Median suture distinct. Antennal calluses large, denuded, smooth. Eyes moderately narrow, transverse. Antennae slightly more than twice as long as an anterior tibia, reaching to the basal sixth of the elytra. First segment rather stout, reaching half way across the eye; second half as long; third as long as first two; fourth equal to third; fifth and sixth slightly longer than fourth; remaining slightly longer than sixth. The antennae taper gradually from the third segment. Pronotum quadrate, as broad as long. Sides converging at the apical fifth. Base somewhat excavated before scutellum. Median suture distinct for a short distance on the middle of the disc. Basal impressed line distinct. Scutellum slender, lance-shaped. Elytra appearing inflated. They are not connate. Poorly mounted specimens may have them overlapping but fresh ones never do. Male anterior tibiae not modified. Inner spur of posterior tibiae spiniform, outer flattened but not very broad.

Type: Say's type lost. Neotype ♀ and neoparatypes in M. C. Z.

Type locality: "Council Bluffs, **Iowa** and near the Rocky Mountains." Neotype locality: Dallas, **Texas.**

Type of *techanus* Haldeman: Present location unknown. May be lost.

Type locality: **Texas**, probably Fort Gates.

Additional localities: From Iowa to Arkansas, west to the Rockies. Common.

Epicauta parva (Haldeman)

Meloe parvus Haldeman, 1852, Stans. Exp. to Gr. Salt L.: 377.

Meloe parvulus Haldeman, 1853, Proc. Ac. Nat. Sci. Phila. **6**:40.

Nomaspis parvulus, Le Conte, 1866, Smiths. Misc. Coll. **6** no. 167, 2nd ed. :156.

Henous parvulus, Van Dyke, 1928, U. Calif. Publ. Ent. **4**:411, pl. 15, fig. 2.

Length: 8 to 12 mm. Black, almost glabrous above and very sparsely pubescent below. Elytra short, not meeting on the midline, leaving almost half of the abdomen exposed. Elytra rugose and shiny; head and pronotum with deep punctures.

Head subtriangular, rather large, with numerous deep uneven

punctures. Median suture fine, sometimes obliterated. Antennal calluses moderate in size, somewhat elevated, smooth. Eyes not prominent, fairly narrow, excavated. Antennae reaching to the basal fourth of the elytra, one and one-half times as long as an anterior tibia. First segment stout, reaching almost to the hind margin of the eye in the male, two-thirds across the eye in the female; second small, two-fifths as long as the first; third as broad and almost as long as the first; fourth and following as short as the second, decreasing gradually in thickness; last segment twice as long as next to last. Segments three to five have their tips obliquely truncated. Intermediate segments broader in the male than in the female. Pronotum quadrate, one-fourth broader than long. Median suture fine, indistinct. Basal impressed line distinct. There is a broad impression on the middle of the disc. Surface as on the head but not so deeply punctured. Scutellum small, of normal shape. Elytra somewhat broadened behind, never meeting on midline. First segment of anterior tarsi of male excavated ventrally at the base, broad at the apical half. Posterior tibial spurs moderately slender, the inner spiniform, the outer sticklike.
Type: Present location unknown.
Type locality: "Route to Santa Fe — Kearns"
Additional localities: **Colorado**: Flagler. **Nebraska**: McCook. **Kansas**: Garden City. **Wyoming**: Cheyenne.

Epicauta fallax Horn

Epicauta fallax Horn, 1885, Trans. Am. Ent. Soc. **12**:111.

Length: 8 to 13 mm. Black. More slender than the other black species. Head and pronotum shiny, with scattered shallow but distinct punctures. Elytra densely punctured.

Head subquadrate. Median suture very fine. Antennal calluses slightly raised, smooth. Clypeus and labrum more densely punctured than the rest of the head, the clypeus densely punctulate besides. Eyes prominent, quite broad, transverse, excavated. Antennae reaching to just beyond the base of the elytra, one and seven-eighths as long as an anterior tibia, filiform, slightly thickened at the third segment. First segment stout, reaching to the middle of the eye; second small, a little more than half as long as the first; third slightly longer than the first and almost as thick; fourth and following five-sevenths as long as the third, decreasing gradually in thickness. Last segment three-fourths as thick as the

third. Pronotum half again as long as wide, narrowly campaniliform. Median suture fine, indistinct. Basal impressed line distinct. Elytra, as well as the underside and lower side of head, loosely clothed with black pubescence. Each elytron with four slightly raised lines, two from the base and two from the humerus. Male anterior legs not modified. Posterior tibial spurs slender, stick-like, quite long.

Type: Lectotype ♂, new designation, Horn Coll., A.N.S.P. No. 8099, examined.

Type locality: Owen's Valley, **California**.

Additional localities: **California**: Independence, July 17 (Wickham). **Nevada**: "Nev." Eddy Coll.

Epicauta albolineata (Dugès)

Cantharis albolineata Dugès, 1877, La Naturaleza, **4**:64.
Epicauta albolineata, Dugès, 1889, Anales del Museo Michoacana :84.
Epicauta duplicata Casey, 1891, Ann. N. Y. Ac. Sci. **6**:172.
Epicauta albolineata, Champion, 1892, Biol. Cent.-Am., Col. **4** pt. 2:416.

Length: 10 to 12 mm. Stout; black, with pubescence cinereous except for the black occiput divided by a median cinereous line, a pair of elongated black spots on the pronotum. Elytra black; margins cinereous, as well as a strong line from humerus to near the apex, another inside it, arising from it near the base and united with it at the apex. There is often an indistinct cinereous line just outside the humeral line.

Head broadly triangular. Median suture distinct but partly covered by pubescence in most specimens. Eyes small, narrow, oblique, excavated. Antennae stout, rather short, of almost uniform thickness, about two and one-third times as long as an anterior tibia. First segment stout, reaching to the middle of the eye; second half as long; third as long as first but more slender; fourth to tenth a little more than half as long as third; last as long as third. In the male, segments three to six slightly swollen, shiny. Pronotum as broad as long, heavy, with the sides parallel for the basal four-fifths, then converging abruptly. Median suture and basal impressed line distinct. In addition, there is a narrow median impression. Visible portion of scutellum very small, covered with cinereous pubescence. Pubescence cinereous below. Pubescence of femora and tibiae also cinereous in part. Anterior femora of male denuded, especially below; anterior tibiae denuded but for

a tuft of cinereous pubescence externally at the base. Anterior tibial spurs of male shorter and stouter than in the female. Inner spur of posterior tibiae slender, spiniform, outer broad, flattened, obtuse.

Type: probably in Mexico City -- Dugès collection, not examined.

Type locality: **Guanajuato.**

of *duplicata* Casey.

Type: Casey Coll., U.S.N.M., examined.

Type locality: **Arizona.**

Additional localities: **Arizona:** Sta. Rita Mts. 5–8000 ft. Snow–July (Fall Coll.).

Epicauta uniforma Werner

Epicauta uniforma Werner, 1944, Psyche **50**:67.

Length: 8 to 12 mm. Black, uniformly and quite densely clothed with dull ferrugineous to golden-ferrugineous pubescence. Close to *alpina* Werner but the head is not narrowly triangular; the first antennal segment of the male reaches only to the hind margin of the eye and the first segment is not covered entirely with golden-ferrugineous pubescence. Pubescence a little coarser and sparser.

Head subquadrate, deeply and quite densely punctured, with the intervals finely and densely punctulate, appearing dull. Median suture distinct. Antennal calluses small, not denuded. Eyes moderately prominent, moderately narrow, excavated. Antennae reaching to the middle of the elytra, two and one-half times as long as an anterior tibia. First segment of male antennae moderately slender with a just perceptible excavation externally near the tip, reaching the hind margin of the eye; of the female reaching half-way across the eye and not excavated; second half as long as the first; third one-third longer than second; fourth and following four-fifths as long as third, decreasing gradually in thickness. Pronotum one-third longer than broad, campanuliform. Median suture distinct to one-fourth from apex. Basal impressed line distinct. Male anterior legs not modified. Inner posterior tibial spur flattened, spiniform, outer flattened, slightly broader apically but pointed.

Type: Holotype ♂, M. C. Z. No. 26,581, examined. (Erroneously listed as ♀ in original paper.)

Type locality: Ramah, **Arizona.**

Additional localities: **Arizona:** Baboquivari Mts., Patagonia Mts., Tombstone, Douglass, Tucson, Nogales, Picacho. **Texas:** Davis Mts., Odell, Chisos Mts. **Colorado:** La Junta, Hoehne.

Epicauta alpina Werner

Epicauta alpina Werner, 1944, Psyche **50**:67.

Length: 10 to 12 mm. Black, elytra tan to brown, the whole densely clothed with appressed golden-ferrugineous pubescence. Quite narrow. Head narrowly triangular, longer than normal.

Head rather narrowly triangular, especially in the male. Median suture generally not visible but may be indicated on the occiput. Antennal calluses not denuded. Eyes not very prominent, oblique, narrow, excavated. Antennae reaching to the basal third of the elytra, slender. First segment of male reaching one-fourth its length beyond the eye, slender, slightly excavated externally near the tip, clothed mainly with golden pubescence; of female, reaching to hind margin of eye and not excavated; second segment of male half as long as first and with a little golden pubescence behind; of female, two-fifths as long as first, with or without golden pubescence; third and following almost equal in thickness, tapering only slightly. Third one and one-third times as long as second; rest slightly shorter. Pronotum two-fifths longer than broad, campanuliform. Median suture and basal impressed line distinct. There is a small midbasal impression. Elytra without markings of any kind, even at base. Male anterior legs not modified. Inner posterior tibial spur flattened-spiniform, outer flattened, a little broader toward apex. Legs without dark markings.

Type: Holotype ♂, M. C. Z. No. 26061, examined.
Type locality: Alpine, **Texas**, 4400–6000 ft.
Additional localities: **New Mexico:** Deming.

Epicauta mimetica (Horn)

Gnathospasta mimetica Horn, 1875, Tr. Am. Ent. Soc. **5**:154.

Length: 8 to 13 mm. Black or dark brown, rather densely and evenly clothed with brownish-cinereous pubescence, which is easily rubbed off. Labrum deeply incised. Mandibles long, meeting at tip.

Head subtriangular. Pubescence sparse. Median suture distinct. Antennal calluses quite long and narrow, extending beyond

the inner margin of the eye. Eyes moderately prominent, oblique, rather narrow, excavated externally near the tip. Antennae slender, reaching to the basal third of the elytra. First segment of male antennae rather slender, reaching one-fifth its length beyond the eye, with a shallow excavation externally near the tip, of female reaching four-fifths across the eye and without excavation; second half as long as third, which is as long as the first in the female, two-thirds as long in the male; fourth and following four-fifths as long as third, decreasing very gradually in thickness. Pronotum rather small, as broad as long. Sides parallel for basal three-fourths, then converging rather abruptly. Median suture lacking. Basal impressed line distinct. Elytra without markings. Inner spur of anterior tibiae of male long and stout, outer normal. Both spurs normal in female. Posterior tibial spurs flattened, inner spiniform, outer broader but still spiniform.

Type: Holotype ♂, A.N.S.P., examined.

Type locality: **Arizona.**

Additional localities: **Arizona:** Riley Coll. (U.S.N.M.). **Texas:** Davis Mts. 1X-20-38 (Ohio State).

Epicauta brunnea Werner

Fig. 6, 7

Epicauta brunnea Werner, 1944, Psyche **50**:67.

Length: 9 to 16 mm. Black, the elytra brown, the whole quite densely clothed with appressed ferrugineous pubescence. Elytra darker across the base. First segment of anterior tarsi of male broad across the pad.

Head subquadrate. Median suture distinct. Antennal calluses very small, denuded. Eyes prominent, transverse, quite broad. Antennae reaching the basal third of the elytra, two and one-fourth times as long as an anterior tibia. First segment in male fairly stout toward tip, reaching half-way across the eye; in the female more slender and reaching two-fifths across the eye; in both sexes there are a few ferrugineous hairs toward the tip. Second segment small, two-fifths as long as the first in the male, slightly more than two-fifths in the female; third about as long as the first two; fourth and following subequal, four-fifths as long as third. The fifth segment is the broadest. The intermediate segments of the antennae are broader in the male than in the female. Pronotum subquadrate,

one-sixth longer than broad. It is broadest four-fifths from the base, the sides tapering gradually to the base and abruptly to the apex. Median suture and basal impressed line distinct, not denuded. Scutellum with ferrugineous pubescence. Male anterior tibiae not modified. First segment of male anterior tarsi broadened, so that the "sole" is about twice as broad as that of the second segment. In the female, it is just slightly broader than that of the second. Inner posterior tibial spur long, sticklike, outer sticklike but shorter.

Type: Holotype ♂, M. C. Z. No. 26604, examined.

Type locality: Alpine, **Texas**, 6000 ft.

Additional localities: **Texas:** Brewster Co., Fort Davis, Sabinal. **Arizona:** Sta. Cruz Village-Cobabi Mts., Superior, Douglass, Capitan Mt., Globe, San Carlos, Cañon Lake, Gila Valley, Whiteriver. **Colorado:** Denver. Occurs from mid-July to mid-September.

Epicauta ingrata Fall

Fig. 17.

Epicauta ingrata Fall, 1907, Trans. Am. Ent. Soc. **33**:258.

Length: 6 to 9 mm. Black; densely and evenly clothed with appressed cinereous pubescence. Antennae very long and slender, reaching beyond the middle of the elytra.

Head subtriangular. Median suture fine, supplemented by a narrow denuded line. Antennal calluses large. Eyes moderately prominent, rather narrow. Antennae very long and slender. First segment just surpassing the eye; second half as long as first; third almost as long as first two; rest three-fifths as long as third, decreasing in thickness from the fourth. Pronotum small, quadrate, a little longer than broad. Median suture distinct. Elytra with black or dark brown scutellar and humeral spot. Pubescence often denser on the margins of the elytra. Male anterior legs not modified. Posterior tibial spurs both slender, spiniform.

Type: Holotype ♂, M. C. Z. No. 24294, examined.

Type locality: Cloudcroft, **New Mexico.**, 9000 ft.

Additional localities: **New Mexico:** Sante Fe Co., Sandia Mts., Coolidge. **Arizona:** Flagstaff, Mormon Lake, Globe, White Mts., Sierra Ancha Mts. **Colorado:** Colorado Springs. Occurs in June and July.

Epicauta cinerea (Forster)

Fig. 3, 4

Meloe cinereus Forster, 1771, Cat. Animals of N. Am. :62.
Meloe clematides Woodhouse, 1800, Med. Repository **3**:213.
Epicauta marginata auct., nec Fabricius, (in part).

Length: 9 to 13 mm. Black, quite densely clothed with appressed pubescence. Two forms occur. One is entirely cinereous except for the base of the elytra. The other has the elytra black except on the margins and a pair of black marks on head and pronotum. Mr. H. S. Barber has found the cinereous form composing about 1% of the population near Washington. It is distinguished from the common potato species, *solani*, by its thick antennae, short, stout first antennal segment and by the rather slender, spiniform posterior tibial spurs. This species appears to be confined to species of *Clematis* in its food habits.

Head subquadrate, minutely granulose, quite densely but not deeply punctured. Median suture distinct. Eyes small, transverse, rather narrow. Antennae reaching to the basal fourth of the elytra, two and one-third times as long as an anterior tibia. First segment stout, reaching one-third across the eye; second three-fourths as long, narrow; third just shorter than first two; fourth as long as first, the stoutest of the median segments; rest gradually decreasing in length and thickness. Pronotum subquadrate, slightly broader apically. Median suture and basal impressed line distinct, the basal the deeper. Tips of femora, tibiae and most of tarsi black. Male anterior legs not modified. Hind tibiae with spurs spiniform, quite slender but outer broader.

Type: Present location unknown to author.

Type locality: **North America.**

Additional locality: Common in the coastal states from New Hampshire to South Carolina and more less sparingly west to Iowa. Occurs from June to September.

Epicauta fissilabris (Le Conte)

Lytta fissilabris Le Conte, 1850, Agassiz L. Sup. **4**:232; 1853, Proc. Acad. Nat. Sci. Phila. **6**:339.
Epicauta fissilabris, Horn, 1873, Proc. Am. Phil. Soc. **13**:102.

Length: 9 to 13 mm. Black, with short black pubescence, as in *corvina*. First segment of antennae much stouter and pronotum less bulged than in that species. Structurally resembles *cinerea*.

Head subtriangular. Median suture fine. Antennal calluses small, denuded, smooth. Eyes moderately prominent, fairly narrow. Antennae reaching to basal third of elytra, one and one-half times as long as an anterior tibia. First segment stout, short, reaching one-third across the eye; second slender, three-fourths as long as first; third twice as long as second; fourth and following two-thirds as long as third, decreasing gradually in thickness. Pronotum one-sixth broader than long. Sides straight, widest four-fifths from base, then converging abruptly. Median suture distinct except on basal fifth. Basal impressed line distinct. Midbasal impression not strong, pronotum not bulged as they are in *corvina*. Male anterior legs not modified. Outer spur of posterior tibiae sticklike, the inner spiniform. The labrum is incised, but no more than in *cinerea* and only slightly more than in *corvina*.

Type: Lectotype ♀, new designation, M. C. Z. No. 5096, examined.

Type locality: **Lake Superior.**

Additional localities: **Hudson's Bay Terr.** (Le Conte Coll.). **Manitoba:** Aweme (Criddle VII-07).

Epicauta solani sp. n.

Fig. 5

Epicauta marginata auct., nec Fabricius (in part).
Epicauta cinerea auct., nec Forster (in part).

Length: 6 to 16 mm. Markings, form, color same as in *cinerea* but with differences in the antennae and tibial spurs. An entirely cinereous form exists but is rare. Only a very few have been seen by the author. They occur in the western part of its range.

Antennae much more slender than in *cinerea*. First segment rather slender, reaching half-way across the eye. *Cinerea* has the first segment very stout by comparison. Second half as long as first, slender; third a little longer than first, slender; fourth to last two-thirds as long as third. The sixth segment is the thickest but the intermediate segments are not conspicuously thickened as they are in *cinerea*. Inner posterior tibial spur flattened, pointed, outer broader end with a blunt tip. They are decidedly more slender in *cinerea*.

This is the common margined blister beetle of potatoes. The name *marginata* cannot be used for it because Fabricius used the

name first for an insect from the Cape of Good Hope and later applied it to one of our North American margined species.

Occurs abundantly from the Atlantic coast to the Rocky Mts., from July to September, often doing considerable damage to potatoes and occasionally to other soft garden plants.

Large numbers of this species have been examined. The author expected during the course of the work that Mr. H. S. Barber, who first noticed the differences between *cinerea* and *solani*, would describe this species. As a result only one short set is designated as type series.

Type: Holotype ♂ (M. C. Z.).

Type locality: Norwood, **Pennsylvania** VII-31 Liebeck Coll.

Allotype ♀, eutopotypical (M. C. Z.), Paratypes: 1♂, 1♀ topotypical VII-24 Liebeck Coll. (M. C. Z.).

Epicauta floridensis Werner

Fig. 1, 2

Epicauta floridensis Werner, 1944, Psyche **50**:68.

Length: 6 to 11 mm. Resembles the cinereous form of *cinerea* but is more slender and has the pubescence sparser. The antennae are intermediate in form between *cinerea* and *solani*. The posterior tibial spurs are slender, as in *solani*.

Head subquadrate, moderately densely punctured and punctulate, except along the median suture. Median suture distinct. Antennal calluses small, slightly elevated, denuded, smooth. Eyes moderately prominent, fairly narrow. Antennae reaching to the basal fourth of the elytra, two and one-third times as long as an anterior tibia. First segment fairly stout, reaching almost to hind margin of eye in the male, halfway across in female; second half as long as first; third as long as first, narrow at base and fairly broad at apex. The first three segments have some cinereous pubescence behind. The fourth is the broadest segment, and is three-fourths as long as third. Rest decreasing gradually in breadth and just perceptibly in length. The intermediate segments of the female antennae are not as thick as in the male. Pronotum subquadrate, one-fourth longer than broad. Median suture and basal impressed line distinct. Elytra uniformly clothed. Anterior legs of male not modified.

Type: Holotype ♂, M. C. Z. No. 26067, examined.

Type locality: Sebring, **Florida.**

Additional localities: **Florida:** Croom, Cleveland, Capron, Biscayne, Tampa, Cutler, Jacksonville, St. Nicholas, Lake Istopoga. **Mississippi:** Lucedale. **New Jersey:** Da Costa.

Epicauta ruidosana Fall

Epicauta ruidosana Fall, 1907, Trans. Am. Ent. Soc. **33**:258.

Length: 9 to 13 mm. This species has been confused with "*marginata*" in collections but it is very distinct. The cinereous margins of the elytra are narrow and very sharply defined. The cinereous pubescence below is sparse and long.

Head subtriangular. Surface quite densely and deeply punctured, sparsely punctulate. Median suture strong. Antennal calluses small, not distinctly elevated. Eyes moderately prominent, fairly narrow. The surface of the body is more densely but shallowly punctured, much more punctulate than the head. Pubescence of head and thorax pale, long, sparse, densest on under side and along midline. Antennae without pale pubescence. They are rather loosely jointed and reach to the basal third of the elytra. First segment reaching to middle of eye, quite stout; second half as long as first, small; third slender, one-fourth longer than the first two; fourth and following two-thirds as long as third, slender, especially toward the tip. Pronotum quadrate, slightly broader than long, appearing flattened on the disc. Median suture and basal impressed line distinct. A narrow median impression supplements the suture. Pubescence concentrated in this groove and on the posterior margin. Elytra with short black pubescence, margined with short cinereous to tannish pubescence. Scutellum also cinereous pubescent. First segment of anterior tarsi of male slightly longer than in the female. Posterior tibial spurs slender, spiniform, the outer longer.

Type: Holotype ♀, M. C. Z. No. 24295, examined.

Type locality: N. Fork of Ruidoso R., White Mts., **Arizona.**

Additional localities: **Arizona:** Ida's Peak—Chiricahua Mts., 7-8000 ft. **Texas:** Casa Grande—Chisos Mts., 7000 ft. Occurs in June and July.

Epicauta punctipennis Werner

Epicauta punctipennis Werner, 1944, Psyche **50**:68.

Length: 10 to 12 mm. Black or dark brown, elytra ferrugineous. Rather densely clothed with tannish-cinereous pubescence.

Elytra with small, sparsely scattered denuded spots. There are no denuded spots on the rest of the body.

Head subquadrate, densely but quite shallowly punctured, densely punctulate. Antennal calluses moderate in size, denuded, shiny. Eyes small, narrow, transverse. Antennae twice as long as an anterior tibia. First segment moderately stout, reaching half-way across the eye, with cinereous pubescence behind; second two-thirds as long as first, quite slender, also with some cinereous pubescence behind; third a little longer than first, the thickest segment; fourth and following three-fifths as long as third, decreasing gradually in thickness. The apical segments are quite slender. Palpi of male smooth beneath, with the apical segments slightly expanded. Sculpture of pronotum similar to that of head. Median suture fine, indistinct near base and apex. Basal impressed line fine. Elytra with brown pubescence at very base. Scutellum with cinereous pubescence. Elytra with sixty to seventy small denuded spots, evenly scattered. Underside dark. All but tips of femora, tibiae and first tarsal segment ferrugineous. Male anterior legs not modified. Posterior tibial spurs slender, the inner spiniform, the outer sticklike.

Type: Holotype ♀, M. C. Z. No. 26159, examined.

Type locality: Columbus, **Texas**, May 24, 1879, Le Conte Coll.

Allotype ♂, from "Tex." Liebeck Coll.

Epicauta balli sp. n.

Length: 6 to 8 mm. Black, sparsely clothed with moderately long cinereous pubescence. First segment of antennae, mouth parts and legs pale ferrugineous.

Head rather elongate in aspect, densely and deeply punctured. Median suture distinct. Antennal calluses smooth. Eyes moderately broad, fairly coarsely granulated. Labrum narrow, deeply and broadly excavated. Mandibles slender. Maxillae similar to those of *mimetica*, the palpi long and slender. First segment of antennae of male stout, cylindrical, reaching two-thirds across the eye, of female reaching half-way across; second about two-fifths as long as first; third twice as long as second in male, not quite twice in female; rest slightly shorter than third, narrowing gradually. Pronotum a little longer than broad, with the sides parallel for the basal three-fourths, then converging abruptly. Median suture distinct. Pronotum and elytra coarsely and deeply punctured.

Spurs of anterior tibiae of male stouter than in the female. Posterior tibial spurs slender, spiniform.

Mr. Frank H. Parker intended to name this species in honor of the collector but has allowed me to describe it here.

Type: Holotype ♂, Calif. Acad. Sci.

Type locality: Patagonia, **Arizona**, Jul. 28, 33. E. D. Ball.

Paratypes: **Arizona:** Nogales, 1 Aug. 24, 39, R. H. Crandall (Crandall Coll.), 2 Sept. 22, 06 (USNM).

Epicauta oregona Horn

Fig. 16

Epicauta oregona Horn, 1875, Trans. Am. Ent. Soc. **5**:153.

Length: 7 to 11 mm. Black, sparsely clothed with rather long cinereous pubescence and with numerous small denuded spots. Antennae subensiform, especially in the male. Some of the segments are flat even in the female. This character easily distinguishes the species from the other maculate species.

Head subquadrate, densely and rather deeply punctured. Median suture distinct. Antennal calluses denuded, shiny, with a strong impression near the inner edge. Eyes fairly prominent, quite narrow. Antennae a little more than two and one-half times as long as an anterior tibia. First segment stout, reaching to the middle of the eye; second small, half as long as first; third almost as long as first, flat, quite broad in male; fourth to tenth three-fourths as long as the third, the fourth very broad in the male. The segments near the apex are very narrow. Last segment one-third longer than tenth. Pronotum subquadrate, one-fourth longer than broad. Sides parallel for basal four-fifths, then converging abruptly. Median suture distinct, supplemented by a narrow median impression. Basal impressed line distinct. Scutellum quite small. Elytra denuded at very base. Below with denuded spots sparser than above. Male with long pubescence on base of the femora but with the legs not otherwise modified. Posterior tibial spurs slender and spiniform.

Type: Lectotype ♂, new designation, A.N.S.P. No. 8098, examined.

Type locality: **Oregon.**

Additional localities: **British Columbia:** Martin. **Washington:** Yakima City, Ellenburg. **Idaho:** Winchester. **Utah:**

Trenton. **Montana:** Perma, Hot Springs. **Colorado:** Montezuma. **Arizona:** Flagstaff. Occurs in June and July. Not common.

Epicauta ensiformis Werner

Epicauta ensiformis Werner, 1944, Psyche **50**:68.

Length: 9 to 10 mm. Black, sparsely clothed with erect black pubescence. Resembles *oblita* in general form but is easily distinguished by its strongly ensiform antennae.

Head subtriangular, shiny, sparsely but deeply punctured. Median suture very fine. Antennal calluses smooth, fairly large. Eyes moderately prominent, fairly narrow. Male antennae reaching to basal fourth of elytra, twice as long as an anterior tibia. First segment stout, hairy, reaching one-third across the eye; second very small, one-third as long as first, also hairy; third large, as long as the first two, broad, somewhat flattened. It is the broadest segment. Fourth and following two-thirds as long as third, slightly flattened, tapering gradually to the apical segment, which is very slender. Segments strongly separated, with the expansion on the posterior side. Pronotum as broad as long, broadest at base, tapering gradually halfway to apex, then converging more abruptly. Median suture fine but distinct. Basal impressed line distinct. Surface similar to that of head. Male anterior legs apparently not modified. Posterior tibial spurs long, the inner slightly longer, slender, spiniform.

Type: Holotype ♂, "Cal" with an ink spot on lower portion of the "a", which may indicate southern California. Liebeck Coll., M. C. Z. No. 26079. Paratype: ♂, "Cal," Fall Coll. M. C. Z.

Epicauta stuarti Le Conte

Epicauta stuarti Le Conte, 1868, Trans. Am. Ent. Soc. **2**:54. Horn, 1873, Proc. Am. Phil. Soc. **13**:101.

Length: 6 to 11 mm. A striking species, looking more like a *Tetraonyx* than an *Epicauta*. Black, densely clothed with long pubescence. Head black down to level of the eyes, orange beyond. Pronotum orange with a pair of rounded black spots. Elytra narrowly orange along suture, black across the base from the humerus obliquely back to near the middle and with a pair of large black fasciae behind. Abdomen with middle of sternites denuded,

smooth. Sides of sternites broadly orange behind. Fifth sternite with apex entirely orange. Pubescence on anterior legs cinereous, sparse.

Head broadly triangular. Median suture distinct. Antennal calluses not denuded. Eyes not prominent, moderately narrow, transverse. Clypeus with pubescence orange, labrum black. Antennae a little more than twice as long as an anterior tibia, tapering slightly. First segment reaching to the middle of the eye; second two-fifths as long as first; third as long as first two; following equal, a little shorter than first. Pronotum almost twice as broad as long, flat, gradually narrowed forward. Midline impressed. A pair of impressions on middle of disc. Scutellum small, with orange pubescence. Male anterior legs not modified. Posterior tibial spurs flattened, sticklike, the outer slightly broader than the inner.

Type: Lectotype ♀, new designation, M. C. Z. No. 5095, examined.

Type locality: **New Mexico.**

Additional localities: **Colorado:** Crowley, Holly, Berkeley, Montclair. **Kansas:** taken by Williston.

Epicauta lemniscata (Fabricius)

Fig. 9

Lytta lemniscata Fabricius, 1801, Syst. Eleutheratorum: 279. Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:341.

Epicauta lemniscata, Horn, 1873, Proc. Am. Phil. Soc. **13**:100. ?Champion, 1892, Biol. Cent.-Am., Coleop. **4** pt. 2:415.

Length: 8 to 16 mm. Pale luteous, with subsutural, discal and submarginal black stripes on the elytra. Pronotum with a pair of longitudinal black stripes, which are sometimes abbreviated or broken, or expanded outward. Head with a pair of elongate curved black marks on the occiput. Below black or partly luteous.

I find it impossible to separate this species satisfactorily from *vittata* unless a series from one locality is at hand. No tendency is shown in the South and West toward a narrowing of the interval between the two outer black stripes on the elytra. These I have called *lemniscata*. In the North this interval is narrowed or obliterated and I call the series *vittata*. Both of these names are so well established that they should not be changed until there is absolute

proof that there is only one species involved. But they are extremely close if not identical.

Head subquadrate, minutely rugose, appearing dull. Rest of body similarly sculptured. Median suture distinct. Antennal calluses broad, moderate in size, touching the eye. Eyes only moderately prominent, transverse. Antennae slender, filiform, slightly flattened but not broadened, reaching to the basal third of the elytra, two and one-half times as long as an anterior tibia. First segment stout, reaching two-thirds across the eye; second slender, three-fifths as long as first; third slightly longer than first two, slightly flattened; fourth three-fourths as long as third; rest decreasing slightly in length. Fifth and sixth as thick as fourth, rest decreasing to a quite slender apex. Pronotum one-third longer than broad. Sides parallel for the basal three-fourths, then converging gradually. A shallow impression crosses the disc at the obtuse angle thus formed. Median suture and basal impressed line distinct. A shallow midbasal impression present. Luteous pubescence forms a median stripe and a pair of lateral stripes outside of black stripes, independent of color of cuticle. Bases of femora, tibiae and part of thorax and abdomen usually at least partly luteous. Male anterior legs not modified. Inner posterior tibial spur flattened, sticklike, outer flattened and somewhat broader.

Type: present location unknown to author.

Type locality: **North America.**

Additional localities: Occurs from New Jersey and Florida to Nebraska and Texas, probably extending far into Mexico. Abundant in early summer, eating cotton, potatoes and other soft plants.

Epicauta vittata (Fabricius)

Lytta vittata Fabricius, 1775, Syst. Ent. :260; 1781, Syst. Ins. :328; 1787. Mant. Ins. :215 (*Litta*). Le Conte, 1853, Proc. Ac. Nat. Sci. Phila. **6**:340, Staig, 1940, The Fab. Types in Hunterian Coll., Coleop. **2**:139, Pl. 56.

Meloe Chapmani Woodhouse, 1800, Medical Repository **3**:214.

Epicauta vittata, Horn, 1873, Proc. Am. Phil. Soc. **13**:100. Staig, 1940, The Fab. Types in Hunterian Coll. :139.

Length: 9 to 14 mm. Structurally identical with *lemniscata*. If the interval between the outer black stripes on the elytra tends to be reduced or obliterated in a series, I have referred the whole series to this species. Occurs from Maine to New Jersey west to

Iowa. Often a serious pest of potatoes and also feeds occasionally on many other soft garden plants.

Type: Lectotype, new designation, Hunter Coll., the specimen described by Staig.

Type locality: "**America.**"

Epicauta occidentalis Werner

Fig. 10

Epicauta occidentalis Werner, 1944, Psyche **50**:69.

Length: 10 to 13 mm. Identical with *lemniscata* except for the broadened antennae and smooth, shiny outer edge of the anterior tibiae and tarsi. Lengths of antennal segments same as in *lemniscata*. First three segments and the last three the same as in that species. Fourth to eighth much flattened, the sixth the broadest. Outer half of anterior tibiae and first two tarsal segments denuded, with only a few scattered punctures, bearing macroscopically invisible hairs.

No intergrades occur between this species and *lemniscata* in my series, although some are from the same locality. Both sexes are represented. Just what the status of this species is will have to be determined by field investigation.

Type: Holotype ♂, M. C. Z. No. 26069, examined.

Type locality: Cambridge, **Nebraska.**

Additional localities: **Kansas:** Abilene. **Colorado:** Rocky Ford, Joes, Fort Collins. **Texas:** Dallas. **Louisiana:** Baton Rouge, New Orleans, Harahan, Belt City.

Epicauta ferruginea (Say)

Fig. 19

Lytta ferruginea Say, 1823, Journ. Acad. Nat. Sci. Phila. **3**:298. Le Conte 1853, Proc. Acad. Nat. Sci. Phila. **6**:341.

Epicauta ferruginea, Horn, 1873, Proc. Am. Phil. Soc. **13**:98.

Length: 6 to 9 mm. Black, densely clothed with rather long ferrugineous pubescence. Outer spur of posterior tibiae broad, inner slender. Third segment of antennae just surpassing the eye.

Head subtriangular, moderately densely punctured, smooth and shiny between the punctures. Median suture visible only on the occiput and there obscured by the pubescence. Antennal calluses

small, denuded, shiny. Eyes prominent, broad, excavated. Antennae rather stout, uniform in thickness, just reaching the base of the elytra, twice as long as an anterior tibia. First segment moderately stout, reaching one-fourth across the eye; second small, half as long as first; third as long as first but more slender; fourth slightly longer than second; fifth to tenth slightly longer than fourth; last as long as first. All segments longer than broad. Pronotum subquadrate, as broad as long, bulging somewhat. The sides converge three-fourths from the base. Median suture absent but a narrow median impression is present. Basal impressed line distinct. Elytra without markings. Some ferrugineous specimens have the marginal pubescence slightly paler. Pubescence below sparser than above. Anterior legs of male not modified.

Type: Say's type lost. Neotype ♀ and 6 neoparatypes in M. C. Z.

Type locality: "Found on the Missouri by Mr. Nuttall." Neotype locality: Cambridge, **Nebraska.**

Additional localities: From Iowa to Idaho, south to Kansas, Texas, and Arizona. Fairly common. Occurs from July to September.

Epicauta fortis (Werner)

Fig. 20

Epicauta fortis Werner, 1944, Psyche **50**:69.

Length: 6 to 9 mm. This species resembles *sericans* greatly in general shape and habitus but is consistently smaller than that species and has the outer spur of the hind tibiae broad and flattened, and the tarsal claws curved from just beyond the middle.

Black, densely clothed with cinereous pubescence. Surface thickly punctured but it is usually not visible under the pubescence. Head subquadrate. Median suture very indistinct. There is a narrow median smooth area on the front. Eyes only moderately prominent, broadly oval, excavated slightly. Antennae black, very short, only one and one-half times as long as an anterior tibia, thick, thicker toward the apex. First segment stout, reaching one-fifth across the eye; second half as long as first; third as long as first. Fourth to tenth equal, two-thirds of the third, increasing slightly in thickness. Last as long as first. The fourth segment just reaches the hind margin of the eye. The first three segments have a few cinereous hairs. Pronotum broad, at broadest part almost as wide as head, as broad as long, broadly campanuliform.

Median suture indistinct but there is a narrow median impression, which is broader and deeper posteriorly. Basal impressed line distinct. A pair of shallow impressions on the disc just behind the middle. Male anterior legs not modified.

The characteristics of this species are very similar to those of *ferruginea* but it is more often cinereous. The general form is broader. The antennae are shorter, the eyes broader. The antennae are stouter, more closely articulated, and with some segments broader than long.

Type: Holotype ♂, M. C. Z. No. 26066, examined.

Type locality: Phoenix, **Arizona.**

Additional localities: **Arizona:** Tucson, Picacho, Florence. **New Mexico:** Las Cruces.

Epicauta strigosa (Gyllenhal)

Lytta strigosa Gyllenhal, 1817, App. to Schoenherr's Syn. Ins. **3**:18. Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:341.

Cantharis nigricornis Melsheimer, 1847, Proc. Acad. Nat. Sci. Phila. **3**:53.

Epicauta strigosa, Horn, 1873, Proc. Am. Phil. Soc. **13**:97.

Length: 6 to 11 mm. Black, rather densely pubescent. But the black background shows through and affects the general color. Pubescence ferrugineous to cinereous, usually with black or dark brown humeral and scutellar stripes, a pair of narrow lines on the pronotum. Legs black. The only species with which this species can be confused, in its range, is *batesii*. Unicolorous specimens resemble that species but have black legs instead of ferrugineous.

Head subquadrate, rather sparsely and shallowly punctured. Median suture distinct. Eyes large, broadly oval but not very prominent, excavated. Antennae black, twice as long as an anterior tibia, thick, almost uniform in thickness. First segment reaching one-third across the eye; second small, half as long as first; third almost as long as first; rest two-thirds as long as third, rather closely articulated. Pronotum one-fourth longer than broad. Basal four-fifths with sides parallel, then converging rather abuptly. Median suture obscure. A narrow median impression present. On the sides of the disc are a pair of shallow longitudinal impressions. Elytra as described above. Suture always pale. Male anterior legs not modified. Posterior tibial spurs slender, sticklike, rather long.

Type: Presumably in Gyllenhal's collection, Zool. Univ. Mus., Upsala.
Type locality: Presumed to be North America.
of *nigricornis* (Melsh.)
Type: specimen in Melsheimer Coll. is hereby designated as lectotype (M. C. Z. No. 26675). It is a specimen without stripes.
Type locality: **Alabama.**
Additional localities: Coastal states from North Carolina to Mississippi. Particularly abundant in Florida. A few specimens from Wellesley, Framingham, and Dover, Massachusetts. One of these has the normal stripes. All the northern specimens are a little smaller and paler than normal.

Epicauta batesii Horn

Epicauta Batesii Horn, 1875, Trans. Am. Ent. Soc. **5**:153.

Length: 6 to 10 mm. Rufo-ferrugineous. Head and underside, except for legs, darker. Sparsely clothed with tannish pubescence.

Head subquadrate, shiny, deeply and densely punctured. Median suture moderately deep. Eyes very prominent, globular, almost round but slightly excavated near the antennae. Antennae two and one-third times as long as an anterior tibia. First segment stout, reaching one-fourth across the eye; second half as long as first; third almost as long as first two, rather slender; rest a little shorter than first, stout, closely articulated. Pronotum one-third longer than wide, broadly campanulate, deeply and densely punctured. Median suture feeble; a median impression present basally. Basal impressed line distinct. A faint margin may be formed on the elytra by slightly denser pubescence. Male anterior legs not modified. The cinereous patch on the anterior femora extends almost the full length. Posterior tibial spurs slender, spiniform.

Type: Lectotype ♀, new designation, A.N.S.P. No. 8092, examined. From the Dejean Coll.
Type locality: Savannah, **Georgia.**
Additional localities: Quite common in Florida and extending as far north as New Jersey. Occurs in fall and winter.

Epicauta callosa Le Conte

Epicauta callosa Le Conte, 1866, Smiths. Misc. Coll. **6** no. 167, 2nd ed: 158. Horn, 1873, Proc. Am. Phil. Soc. **13**:99.

Length: 7 to 10 mm. Black, densely clothed with tannish to rufo-ferrugineous pubescence. Rather slender. Pronotum always with a pair of small, slightly raised, denuded areas just before the middle.

Head subquadrate, shiny, densely and finely punctured. Antennal calluses not denuded. Eyes broad, excavated. Antennae fairly slender, two and one-half times as long as an anterior tibia. First segment rather stout, reaching one-third across the eye; second half as long as first, almost as broad as long; third a little longer than first, quite slender; rest two-thirds as long as third, loosely articulated, equal in thickness. Pronotum one-fourth longer than broad, campanuliform. Surface similar to head. Median suture distinct and with a basal median impression. Basal impressed line distinct. Elytra often with the pubescence slightly paler on the margins. Male anterior legs not modified. Posterior tibial spurs slender, sticklike, the outer sometimes a little broader.

Type: Lectotype ♀, new designation, M. C. Z. No. 4996, examined.

Type locality: **Nebraska**.

Additional localities: **Nebraska**: Edgar 7–28. **Kansas**: Ellsworth 8–4, Fort Hayes. **Oklahoma**: Guyman. **Texas**: Denton Co. 5–27, Flatonia, El Paso, Alpine, Dallas.

Epicauta sericans Le Conte

Fig. 21

Epicauta sericans Le Conte, 1866, Smiths. Misc. Coll. **6** no. 167, 2nd ed :158. Horn, 1873, Proc. Am. Phil. Soc. **13**:98.

Length: 7 to 11 mm. Stout, black, densely clothed with cinereous pubescence. Posterior tibial spurs slender, sticklike. Tarsal claws curved from the base.

Head broadly triangular, finely and densely punctured. Median suture not discernible. Eyes moderately prominent, broadly oval, slightly excavated. Antennae black, uniform in thickness, a little more than one and one-half times as long as an anterior tibia. First segment reaching one-fourth across the eye, with cinereous pubescence; second half as long as first; third a little longer than first and more slender; fourth to tenth two-thirds of third, closely articulated, and just perceptibly thicker apically. Last segment as long as third. Pronotum stout, almost as wide as the head, as

broad as long, subquadrate. Sides parallel for basal three-fourths, then converging abruptly. Median suture not visible, replaced by a narrow median impression. Basal impressed line distinct. Below uniform except for the black tarsi. Male anterior legs not modified. Posterior tibial spurs slender, sticklike.

Type: Lectotype ♀, new designation, M. C. Z. No. 4994, examined.

Type locality: **Kansas.**

Additional localities: Common from Kansas to Texas but has a much wider range. I have seen it from Indiana, Alabama, Mississippi, Iowa, Alberta, Saskatchewan, Utah, Colorado, Arizona, New Mexico, Texas, Oklahoma, Kansas, and Nebraska. Occurs mostly in June and July.

Epicauta atrata (Fabricius)

Fig. 18

Lytta atrata Fabricius, 1775, Syst. Ent. :260; 1781, Spec. Ins. **1**:329. *nec* 1787, Mant. Ins. **1**:215, where listed as from Barbary. Staig, 1940, the Fab. Types in Hunterian Coll. Coleop. **2**:135, Pl. 55.

Meloe trichrus Pallas, 1789 (See Sherborn-Ann & Mag. Nat. Hist., Feb. 1891), Icones Ins. (1781) :100, Tab. E, fig. 32 (1782).

Lytta coracina Illiger, 1804, Mag. f. Inskunde **3**:171 (given as *nom. nov.* for American *atrata* but it was described first (1775), the Barbary species in 1787.

Lytta convolvuli Melsheimer, 1848, Proc. Acad. Nat. Sci. Phila. **3** (1847) :53. (as a variety of *atrata* Fab.). Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:339.

Epicauta convolvuli, Le Conte, 1866, Smiths. Misc. Coll. **6** no. 167, 2nd ed. :157. Horn, 1873, Proc. Am. Phil. Soc. **13**:97.

Epicauta trichura Wellman, 1910, D. E. Z. **6**:24 (This change of names was unwarranted. *Trichrus*, as used by Pliny, was feminine, for a three-colored gem.)

Length: 6 to 12 mm. Black or dark brown, the head sometimes bright rufous. Pubescence entirely black, black with margins of elytra cinereous, cinereous with obscure dark discal and humeral stripes on the elytra, or entirely cinereous. Can be distinguished in the black form from *pensylvanica* by its larger scutellum, stouter second antennal segment and more erect pubescence on the head and antennae.

Head subquadrate, moderately densely, deeply punctured, the

intervals finely and densely punctured in the male, smooth in the female. In a few specimens from Indiana, the head is much expanded behind the eyes. Median suture fine, visible only on the occiput. Eyes prominent, broad, only slightly excavated. Antennae a little over twice as long as an anterior tibia. First segment stout, reaching to just behind the anterior margin of the eye; second also stout, two-fifths as long as first; third more slender, almost as long as first two; rest a little longer than the second, equal in length and thickness. Pronotum slightly broader than long. Sides parallel for the basal four-fifths, then converging abruptly. Surface densely and rather deeply punctured. Median suture indistinct. An indistinct basal median impression present, one before the middle and a longitudinal pair on the sides. Scutellum normal in size. Male anterior legs not modified. Inner spur of hind tibia slender, spiniform, outer somewhat broad, flattened.

Type: The specimen figured by Staig hereby designated lectotype. Hunterian Coll., Glasgow University.

Type locality: **North America.**

Additional localities: From Maryland and North Carolina to Nebraska and Texas. Occurs in early summer on Convolvulaceae.

Epicauta pruinosa LeConte

Epicauta pruinosa Le Conte, 1866, Smiths. Misc. Coll. **6** no. 167, 2nd ed.: 158. Horn, 1873, Proc. Am. Phil. Soc. **13**:98.

Length: 6 to 11 mm. Black, very sparsely clothed with fine cinereous pubescence so that the surface appears greyish black. Median suture of head and pronotum conspicuous. Surface moderately densely punctured, finely punctulate so that it appears dull.

Head subtriangular. Median suture very distinct, supplemented by smooth, shiny margins. Antennal calluses small, denuded, shiny. Eyes fairly prominent, moderately narrow. Pubescence on under side of the head erect, longer than on the rest of the body. Antennae almost uniform in thickness, reaching to just beyond the base of the elytra, about one and two-thirds times as long as an anterior tibia. First segment stout, reaching almost to the middle of the eye in the male, one-third across in the female; second small, half as long as first; third almost as long as first two; fourth and following three-fourths as long as third. Pronotum broadly

campanulate, as broad as long. Median suture very distinct and free of pubescence. Basal impressed line distinct, pubescent. Base of pronotum notched at middle. Hind margin with denser pubescence. Anterior legs of male not modified. Posterior tibial spurs both slender, spiniform.

Type: Lectotype ♀, new designation, M. C. Z. No. 4995, examined.

Type locality: **Colorado.**

Additional localities: **Manitoba:** Olds. **Alberta:** Winnipeg. **Washington:** Blewett, Signal Peak. **Idaho:** Lava Hot Springs. **Montana:** Maiden City. **Wyoming:** Bridger Basin. **Colorado:** Mt. Manitou, Marshall Pass, Skyway 10,000 ft., Pikes Peak 10,000 ft. Halfway House, Mt. Lincoln, Alma, Little Willow Ck. – Gun Co.

Epicauta immerita Walker

Epicauta immerita Walker, 1866, Lord's Naturalist Vancouver Is., etc.

Length: 6 to 9 mm. Closely related to *pruinosa*. The pubescence is twice as dense and longer so that the color is most cinereous, with very little black background showing through. The margins of the elytra are a little more densely pubescent. I can find no other differences in the series at hand. In this species, the pubescence is easily rubbed off so that large black areas may be exposed.

Type: presumably in the British Museum.

Type locality: **Vancouver Island.**

Additional localities: **British Columbia:** Cowston. **Washington:** Yakima Valley. **Oregon:** The Dalles, Umatella. Occurs in June.

Epicauta piceiventris Maydell

Epicauta piceiventris Maydell, 1934, Trans. Am. Ent. Soc. 60:327.
Epicauta elongatocalcarata Maydell, 1934, *op. cit.* :328.

Length: 8 to 12 mm. Black, with no visible pubescence above. There is fine, short pubescence in the punctures, visible under some magnification. Below, the pubescence is fairly short, more dense, dark brown. Resembles a denuded *pruinosa* but is undoubtedly distinct. No signs of abrasions were evident in the series examined and all of the *pruinosa* specimens had cinereous, not brown, pubescence.

Head triangular, densely and deeply punctured, the intervals

finely punctulate, therefore dull. Median suture distinct. Antennal calluses small, denuded, smooth. Antennae reaching to the basal fifth of the elytra, twice as long as an anterior tibia. First segment moderately stout, reaching two-fifths across the eye; second stout, half as long as first; third a little longer than first, more slender; fourth to tenth three-fifths as long as third; last as long as third. Third to last segments almost equal in thickness. Pronotum quadrate, slightly broader than long. Sides diverging gradually to four-fifths from base, then converging abruptly. Disc flattened. Median suture and basal impressed line distinct. Surface as on head but more shiny posteriorly. Elytra more shallowly punctured, more sparsely punctulate, therefore more shiny. Anterior legs of male not modified. Posterior tibial spurs quite long, slender, spiniform.

Type: Holotype ♂, M. C. Z. No. 23499, examined.

Type locality: **Utah.**

of *elongatocalcarata*

Type: Holotype ♀, M. C. Z. No. 23498, examined.

Type locality: Atlanta, **Idaho.**

Additional localities: **Montana:** Darby 7000 ft., Gallatin Co. 5000 ft., Gallatin Nat. For. **Wyoming:** National Park, Bridger Basin. **Idaho:** Bingham Co. **Utah:** Provo. **Colorado:** Summit, Veta Pass. Occurs from June to August.

Epicauta sanguinicollis Horn

Epicauta sanguinicollis Dejean, 1833, Cat. des Coleop. 2nd ed. :225, (*nomen nudem*).

Lytta sanguinicollis Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:344. (described from a manuscript figure so not valid).

Epicauta sanguinicollis Horn, 1873, Proc. Am. Phil. Soc. **13**:103, (quotes only Le Conte reference); 1874, Trans. Am. Ent. Soc. **5**:37 (first valid description, from a single specimen.)

Length: 6 to 8 mm. Head and pronotum bright rufous, shiny. Elytra black, with the margins and an oblique humeral stripe cinereous-pubescent.

Head subquadrate, sparsely but deeply punctured, very sparsely pubescent. Median suture distinct only on occiput. Front broadly impressed, darker than rest of head. Mouth parts black. Eyes prominent, broadly oval, oblique. Antennae uniform in thickness, twice as long as an anterior tibia. First segment stout, reaching to

the middle of the eye; second not quite half as long as first; third almost as long as first two; rest three-fifths of third. Pronotum broadly campanulate, punctured like head. Median suture distinct. A narrow median impression present. Basal impressed line distinct. Line on elytra from humerus to near the inner hind angle. Below entirely black, with scattered cinereous pubescence. Male anterior legs not modified. Posterior tibial spurs slender, sticklike.
Type: Holotype ♀, A.N.S.P., examined.
Type locality: **Florida.**
Additional localities: **Florida:** Alachua (on sea-island cotton), Citrus Co., Sumpter Co., Lake Poinsett.

Epicauta punctcollis (Mannerheim)

Fig. 22

Lytta puncticollis Mannerheim, 1843, Bull. Moscou **16**:288. Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:336.
Epicauta puncticollis, Horn, 1873, Proc. Am. Phil. Soc. **13**:97.

Length: 6 to 13 mm. Black, with scattered erect pubescence. Punctures on the pronotum deep and more or less dense. Surface shiny. Apical segments of the antennae thicker than the middle segments. Outer division of the tarsal claws bent only near the tip. Inner division almost as long as the outer.

Head subquadrate. Median suture fine but distinct. Antennal calluses not prominent, punctured. Eyes rather prominent, quite broad, transverse, excavated. Antennae longer than in *oblita* and with the segments not nearly as closely articulated, reaching to the basal fifth of the elytra. First segment moderately stout, reaching half-way across the eye; second half as long; third almost as long as the first two, quite slender, longer and more slender than in *oblita;* rest about two-fifths as long as the third, fairly loosely articulated, becoming thicker toward the apex. Pronotum subcampanuliform, one-fourth longer than broad. Median suture very distinct. Basal impressed line not as distinct. Elytra usually with several feebly raised lines. Male anterior legs not modified. Posterior tibial spurs slender, sticklike.
Type: specimens probably in the Mannerheim Coll. in Moscow.
Type locality: **California.**
Additional localities: California to Washington, extending east into Nevada and Montana. A single specimen in the Purdue

University collection from Jackson Co., Indiana. This specimen is probably a stray brought in accidentally.

The pubescence varies from very short to very long. All of the short-haired specimens are from California. Long-haired specimens make up most of the California specimens and all of the series from the rest of the range.

Epicauta oblita (Le Conte)

Fig. 23

Lytta oblita Le Conte, 1851, Ann. Lyc. Nat. Hist. N. Y. **5**:162; 1853, *Proc. Acad. Nat. Sci. Phila.* **6**:339.
Epicauta oblita, Horn, 1873, Proc. Am. Phil. Soc. **13**:97.

Length: 10 to 11 mm. Black, with short, erect pubescence. This species is shinier than *puncticollis*, has the punctures on head and pronotum fairly dense and deep. The antennae have the apical segments slightly more slender than the middle segments. Tarsal claws as in *puncticollis*.

Head subquadrate, shiny. Median impressed line fine but distinct. Antennal calluses small, punctured. Eyes rather prominent, oval, excavated. Antennae reaching almost to the base of the elytra. First segment stout, reaching one-third across the eye; second more slender, half as long as first; third slightly shorter than first two; rest two-fifths as long as third, becoming slightly thicker at the middle and more slender toward the apex. Pronotum subquadrate, a little longer than broad. Median suture fine. Basal impressed line distinct. Pubescence below denser than above. Anterior legs of male not modified. Posterior tibial spurs slender, sticklike.

Type: Lectotype ♀, new designation, M. C. Z. No. 4993, examined.
Type locality: San Francisco, **California**.
Additional localities: Sacramento, **California**, Aug.

Epicauta barberi Werner

Epicauta barberi Werner, 1944, Psyche, **50**:69.

Length: 12 to 13 mm. Black, fairly densely clothed with semierect black pubescence. Head and pronotum shiny. The head is much more densely and finely punctured than in *puncticollis* or

oblita. The outer division of the tarsal claws is curved from the base and the inner is not more than three-fourths as long as the outer.

Head subquadrate, finely and densely punctured. Median suture fine but distinct. Antennal calluses small, inconspicuous. Eyes fairly large, moderately broad, excavated. Antennae one and three-fourths times as long as an anterior tibia, thicker at the apex than at the middle. First segment fairly stout, reaching one-fourth across the eye; second small, half as long as first; third as long as first two; fourth and following two-thirds as long as third, gradually increasing in thickness. Pronotum quadrate, slightly longer than broad. Median suture fine but distinct, extending three-fourths from base. Basal impressed line distinct. Punctures as fine as on the head but not as dense. Elytra longer than in *puncticollis* or *oblita*. Anterior legs of male not modified. Posterior tibial spurs slender, the inner spiniform, the outer sticklike.

Type: Holotype ♂, U.S.N.M., examined.

Type locality: La Panza, **California**, May 17-38, C. C. Wilson.

Additional records: 1 ♂ San Luis Obispo, **California**, May 16–25. C. C. Wilson. For Mr. H. S. Barber of the U. S. National Museum.

Epicauta kansana Werner

Epicauta kansana Werner, 1944, Pyche, **50**:70.

Length: 10 to 11 mm. Black, with scattered semi-erect but rather short pubescence, resembling *oblita* and *puncticollis*. Head and pronotum shiny, the head more densely punctured than the pronotum. Inner division of the tarsal claws as long as the outer, but very slender. The outer curves near the tip. Fourth segment of the antennae longer than the fifth.

Head subquadrate, shiny, rather densely and finely punctured, the intervals with scattered punctulation. Median suture fine and indistinct. Antennal calluses small, smooth. Eyes broad, excavated. Antennae one and two-thirds times as long as an anterior tibia, thicker at the apex than at the middle. First segment rather slender, extending one-fifth across the eye; second small, half as long as first; third slender, as long as first two; fourth three-fourths as long as third; rest slightly shorter than fourth. Pronotum subquadrate, a little longer than broad. Median suture fine, extending three-fourths from base. Basal impressed line distinct. Surface

as on the head but more sparsely punctured. Anterior legs of male not modified. Posterior tibial spurs slender, the inner spiniform, the outer sticklike. Tarsi more slender than in *puncticollis, oblita,* or *barberi.*

Type: Holotype ♂, U.S.N.M., examined.

Type locality: Sedgwick Co., **Kansas.** J. C. Warren, June 4, 1910.

Additional records: several more taken on June 4 and April 7.

Epicauta calcarata Werner

Epicauta calcarata Werner, 1944, Psyche **50**:70.

Length: 7 to 9 mm. The mouth parts of this species would place it in the genus *Gnathospasta,* but the antennae are similar to those of *E. sericans* while those of *G. mimetica* are very much like those of *virgulata,* of the old genus *Macrobasis.* For this reason and because the genitalia are of the *Epicauta* form, I have discarded *Gnathospasta* as a natural group. It seems rather to be a stage of evolution within *Epicauta.*

Black, completely, rather densely clothed with tannish-grey pubescence. Pronotum large and conspicuously globose. Tibial spurs heavy and incurved.

Head triangular. Median suture fine but distinct. Antennal calluses not denuded. Eyes moderately broad, slightly excavated. Labrum sparsely pubescent, deeply notched but not as deeply as in *mimetica.* Mandibles long and rather slender, crossing at the tip (meeting in *mimetica.*) This crossing is due to an elongated tip but the mandibles are otherwise similar in the two species. Antennae short, reaching to a little beyond the base of the elytra, one and three-fourths times as long as an anterior tibia, almost uniform in thickness. First segment stout, reaching the middle of the eye, clothed with cinereous pubescence; second small, half as long as first; third as long as first; fourth to tenth subequal in length and thickness, two-thirds as long as third; last as long as third. All but the first are black. Pronotum subglobose, almost as wide as head. Median suture and basal impressed line distinct. There is a trace of a pair of midlateral impressions. Scutellum quite small. Legs rather stout and short. Both anterior tibial spurs large, slightly incurved, the inner slightly the stouter. Middle and posterior tibial spurs also larger than normal, slightly incurved. Outer spur

of hind tibiae slightly broader than inner. All spurs sticklike, blunt. Anterior tarsi of male not modified.

Type: Holotype ♀, M. C. Z. No. 26065, examined.

Type locality: Roswell, **New Mexico.**

Additional localities: **New Mexico:** Carlsbad, Dim Lake-Pecos Val. **Texas:** Culbertson Co., Ft. Stockton. Taken in August and September. Scarce.

Epicauta heterodera Horn

Epicauta heterodera Horn, 1891, Trans. Am. Ent. Soc. **18**:43.
Epicauta watsoni Blatchley, 1918, Can. Ent. **50**:58.

Length: 7 to 9 mm. This species exhibits a remarkable reversal of the ordinary. In it the female, instead of the male, departs from the usual pattern. The pronotum is denuded, smooth in the female, pubescent in the male. It is flattened in both sexes. Pubescence pale to dark tannish-cinereous, quite dense, short.

Head triangular. Median suture distinct. Antennal calluses small, not denuded. Eyes prominent, broadly oval to almost circular, with an impression of very small to medium extent on the anterior margins near the base of the antennae, none by the mandibles. Occiput slightly notched. Antennae reaching to the basal fifth of the elytra, two and one-fourth times as long as an anterior tibia. First segment stout, reaching one-third across the eye; second more slender, half as long; third as long as first two; rest as long as the first, increasing slightly in thickness toward the apex. Pronotum broadest at the base, three-fourths as wide as the base of the elytra. Less than half as wide at the apex, tapering from the base but bulging toward the middle, especially in the male. About as long as width across base. Median suture absent. Basal impressed line fine. A shallow median impression and a pair of lateral impressions, connected near the base, may be present. Pronotum of female smooth, shiny, with scattered faint punctures. Elytra often appearing faintly margined because of the denser pubescence on the edges. Anterior legs of male not modified. Posterior tibial spurs slender, spiniform.

Type: Lectotype ♀, new designation, A.N.S.P. No. 8093, examined.

Type locality: **Florida.**

of *watsoni*

Type: Holotype ♀, Blatchley Coll., Purdue U., examined.
Type locality: Gainesville, **Florida.**
Additional localities: **Florida:** Kissimmee, De Funias Spgs., Monticello, Gainesville, Crestview, Lake Co., Alachua Co., St. Augustine. **Georgia:** Thomasville, Tifton. **Alabama:** Kushla, Mobile. **Mississippi:** Lucedale.

Epicauta californica nomen novum

Fig. 11

Lytta maura Le Conte, 1851, Ann. Lyc. Nat. Hist. N. Y. **5**:162; 1853, Proc. Acad. Nat. Sci. Phila. **6**:339.
Epicauta maura, Horn, 1873, Proc. Am. Phil. Soc. **13**:97, nec Faldeman, 1833.

Length: 8 to 10 mm. Black, rather shiny, sparsely clothed above with short black pubescence. Underside of head always with some white pubescence, as in *alphonsii*. Femora of male with marginal long white pubescence. Middle femora of male curved, as in *alphonsii*.

Head subtriangular, sparsely and deeply punctured, finely rugulose. Median suture distinct. Antennal calluses not strongly elevated, less strongly rugulose than rest of head. Eyes rather prominent, narrow, oblique, excavated. Antennae slender in the male, reaching to the middle of the elytra, two and three-fourths times as long as an anterior tibia, in the female reaching to the basal third of the elytra, twice as long as an anterior tibia. Male antennae: first segment reaching two-thirds across the eye; second two-fifths as long as first, slender; third as long as first two; fourth and following slender, almost uniform in thickness, three-fifths as long as third. Antennae of female with segments of much the same proportions as in the male but the whole shorter and more slender. The first segment reaches one-third across the eye. Pronotum broadly campanulate, slightly longer than broad. Surface finely rugulose, sparsely punctured, not as deeply as on the head. Median suture fine, indistinct. Basal impressed line deep. Elytra duller than head and pronotum.

Below black. Male with pubescence on anterior femora and trochanters mainly white. Middle and posterior tibiae of male flattened and smooth behind, this surface margined with long white pubescence; middle tibiae quite strongly curved. Anterior tarsi of

male as in *alphonsii* but with the first segment narrower. Posterior tibial spurs slender, spiniform.

Type: Lectotype ♂, new designation, M. C. Z. No. 5099, examined.

Type locality: **California.**

Additional localities: **California:** Adobe Falls-San Diego Co., Spreckles, Riverside, Colorado Desert, Cabagon, San Bernardino, Pasadena. Occurs in September and October.

Epicauta alphonsii Horn

Epicauta alphonsii Horn, 1874, Trans. Am. Ent. Soc. **5**:38; 1875, Trans. Am. Ent. Soc. **5**:153.

Length: 8 to 9 mm. Black, the elytra conspicuously margined with white. Middle femora of male strongly curved. Close to *californica*.

Head ovate in the male, subtriangular in the female, finely rugulose, with scattered large punctures. Median suture fine. Eyes oblique, moderately narrow, excavated. Antennae three times as long as an anterior tibia in the male, two and one-half times in the female. The proportions of the antennal segments are the same in both sexes but in the male segment three and beyond are heavier, tapering gradually. First segment reaching one-third across the eye; second half as long as first; third two and one-half times as long as second; rest two-thirds as long as third. Pronotum as broad as long, quadrate, finely rugulose and sparsely punctured. There are some white hairs on the basal and apical margins. Median suture feeble. Basal impressed line strong. Pubescence on elytra sparse except on margins, where it is dense and white. Legs of male as in *californica* but with a tuft of long white hairs externally at the base of the anterior tibiae, these hairs each with an almost right-angled bend toward the apex. First segment of male anterior tarsi much compressed, broad. Rest of segments also compressed but narrow. Posterior tibial spurs long, slender, spiniform.

Type: Holotype ♀, M. C. Z. No. 125, examined.

Type locality: **California.**

Additional localities: **California:** Hesperia — Mojave Desert, Los Angeles Co. Occurs in the fall. Seems to be scarce.

Epicauta caviceps Horn

Epicauta caviceps Horn, 1873, Proc. Am. Phil. Soc. **13**:99.

Length: 6 to 9 mm. Black, moderately densely clothed with gray to almost white pubescence. Occiput with a pair of prominent callosities.

Head subquadrate, pubescent except for a narrow median line, weak antennal calluses and a border around the eyes, which is narrow except at the inner posterior margin where it is broadened to contain a shallow depression. Occiput to front with a strong U-shaped impression, which divides a strong bulge on the occiput, producing a pair of prominent callosities. Eyes oblique, narrow, especially above the antennal excavation, but not pointed, attaining the occipital callosities. Antennae moderately slender, tapering slightly toward the apex. First segment moderately stout, reaching one-third across the eye; second half as long as first; third twice as long as second; rest a little shorter than third, but for the last, which equals the third. Pronotum about as broad as long, with the sides parallel for the basal two-thirds, then converging abruptly. Median suture and basal impressed line distinct and with a broad oblique impression extending from just in front of the middle almost to the anterior angles. This is usually supplemented by a broad excavation near the posterior angles. Surface clothed with dense pubescence, very short near the apex. Elytra with a black scutellar spot. A raised area extends from the suture at a third from the base, where there is a small hump, obliquely forward to the humeral angles so that there appears to be a triangular flat area at the base of the elytra. A narrow raised area may extend straight back from the humeral angles. Posterior face of femora denuded and shiny in male. Anterior tibial spurs of male short, stout, the inner slightly incurved. Posterior tibial spurs slender, spiniform. Third and fourth abdominal sternites sometimes with a median posterior black spot. Fifth often with an elongate median mark. The second to last abdominal segments have an anterior lateral black spot near the edge, which may be concealed in shrunken specimens.

Type: Lectotype ♂, new designation, Horn Coll., A.N.S.P. No. 8094, examined.

Type locality: **Arizona.**

Additional localities: **Arizona:** Phoenix, Tucson, Sabino Canon-Sta. Catalina Mts., Pipe Spring — Coconino Co., Peach Spg.

Utah: Leeds, St. George. Seems to be a fall species as all of the records are in September and October. Apparently fairly common where it occurs as several large series have been seen from the Phoenix region.

Epicauta impressifrons Van Dyke

Epicauta impressifrons Van Dyke, 1929, Bull. Br. Ent. Soc. **24**:12.

Length: 5 to 7 mm. Black, rather sparsely clothed with long, easily denuded, appressed cinereous pubescence. Resembles *caviceps* Horn but has the occipital callosities small and lacks velvety pubescence on the pronotum.

Head roughly triangular, sparsely but rather deeply punctured, shiny. Median suture distinct. Occiput impressed, but not as deeply as in *caviceps* Horn so that the occipital callosities are somewhat indistinct. Eyes oblique, narrow, but not as narrow as in *caviceps*, surrounded by a quite broad denuded border, which merges anteriorly with the smooth antennal calluses. A feeble impression at inner posterior margin. Antennae slender, reaching to the middle of the elytra, twice as long as an anterior tibia. First segment reaching to middle of eye; second half as long as first; third as long as first two; fourth as long as first; rest just perceptibly toward apex. Pronotum bulging. Basal impressed line distinct ? but median suture absent. There is a suboval depression on the middle of the disc and another just before it. These vary in depth. Elytra with black scutellar and humeral spot. Anterior tibiae of male with two fairly stout, incurved spiniform spurs. Posterior border of all of the femora of the male flattened, glabrous, shiny. Middle and posterior femora with this area margined above by long cinereous hairs. Posterior tibial spurs slender, sticklike.
Type: Holotype, Mus. Cal. Acad. Sci. No. 2592.
Type locality: Palm Springs, Riverside Co., **California**.
Additional localities: **California**: Cabazon, Indio. Specimens taken in October, November and March.

Epicauta rileyi Horn

Epicauta Rileyi Horn, 1874, Trans. Am. Ent. Soc. **5**:37.

Length: 7 to 9 mm. Black, densely clothed with yellow-cinereous pubescence. A deep pit on the inner margin of the eyes.

Head roughly triangular, moderately densely to densely pubescent, except for a denuded margin around the eyes, which is very narrow in front up to one-third the width of the eye behind. A deep pit on the inner margin of each eye. Occiput with a denuded median line and impression but this is not prominent. Vertex slightly bulged. A partly denuded bulge just above the clypeus. The eyes are very peculiar in being almost absolutely smooth and are moderately broad, uniform, transverse, prominent. Antennae reaching to the basal third of the elytra. First segment stout, reaching one-third across the eye, densely pubescent, black in front, yellow behind; second two-thirds as long as first, more slender; third about twice as long as second; rest subequal, three-fourths as long as third, except the last, which is equal to the third. Pronotum a little broader than long. Basal impressed line and median suture distinct. With a lateral pair of broad longitudinal impressions. The pubescence may be black in these impressions, especially anteriorly. Elytra with black scutellar spot. Suture slightly elevated just beyond the middle. Second to fourth abdominal sternites with a posterior median black spot. First to fifth with an anterior lateral spot near the edge. The lateral spots sometimes are lacking. Anterior tibial spurs of male shorter but not broader than in the female, spiniform. Posterior tibial spurs slender, spiniform. The pubescence is sparse but not completely lacking on the posterior face of the femora of the male.

Type: Lectotype ♀, new designation, Horn Coll., A.N.S.P. No. 8095, examined.

Type locality: **Arizona.**

Additional localities: **Arizona:** Phoenix, Nogales, Atascasa Mts., Reef, Ft. Huachuca, Baboquivari Mts., Tucson. **Sonora:** Arispe. Specimens taken in October and November.

Epicauta straba Horn

Epicauta straba Horn, 1891, Trans. Am. Ent. Soc. **18**:42.
Epicauta foxi Van Dyke, 1929, Bull. Br. Ent. Soc. **24**:127.

Length: 5 to 8 mm. Black, clothed above with short pubescence. Eyes oblique, strongly pointed at the inner margin. I have seen no such eye form in any other species. Pubescence black in main part. There is always cinereous pubescence on the femora and trochanters. The pubescence of the underside of the body varies from entirely black in the typical form to entirely cinereous in the

form *foxi* Van Dyke. which also has the margins of the elytra cinereous pubescent. All intergrades occur in a series from Adobe, San Diego Co., California.

Head triangular, densely and rather deeply punctured, except near the midline, with the intervals shiny, smooth. There is a flat area behind each eye. This causes the middle of the occiput to appear bulged. Median suture fine but distinct, supplemented by a narrow but moderately deep impression on the occiput. Eyes narrow, obliquely directed backward, reaching almost to the occiput. Antennae tapering gradually from the base, reaching to the middle of the elytra. First segment stout, reaching one-fourth across the eye; second slender, three-fifths as long as first; third slightly longer than first two; fourth three-fourths as long as third; rest just perceptibly shorter than fourth. Pronotum quadrate, as broad as long. Median impressed line very distinct, but median suture fine and indistinct. There is a shallow impression on the middle of the disc and a pair of very shallow and indistinct impressions on the sides. Femora of male flattened behind, smooth and shiny; middle and posterior femora fringed above with long cinereous pubescence. Anterior tibiae of male with two slender, spiniform spurs. Posterior tibial spurs slender, spiniform.

Type: Lectotype ♂, new designation, Horn Coll. A.N.S.P. No. 8096, examined.

Type locality: San Bernardino, **California.**

of *foxi* Van Dyke

Type: Holotype, Cal. Acad. Sci.

Type locality: Jacumba, San Diego, Co., **California.**

Additional localities: **California:** Pasadena, Los Angeles Co., Pom Mts., near Claremont, San Diego Co. **Washington:** Some specimens in the Bowditch Coll. (M. C. Z.) labelled "Wash." Many of the state labels in the Bowditch collection have been found to be erroneous. Specimens collected in September and October.

Epicauta excavatifrons Maydell

Epicauta excavatifrons Maydell, 1934, Trans. Am. Ent. Soc. **60**:330.

Length: 7 to 9 mm. Black, fairly densely clothed with white pubescence. The surface is visible throughout so that the species appear gray. Pronotum with a prominent tubercle in the middle.

Head subtriangular, with a broad depression back from each eye

and a rather sharp depression between the eyes, back from each pair of pits below the middle of the front. These depressions form a short ridge back from the inner margin of each eye. Median suture distinct. Midline, margin of eyes (broader behind) and antennal calluses denuded, shiny. Eyes moderately narrow, broader toward the center than outward, smooth, but not as strikingly so as in *rileyi* Horn, oblique. First segment of antennae short, stout, flattened on its inner surface as though modified to fit over the eye; second three-fifths as long as first, also flattened on inner surface; third as long as first two; fourth and following three-fifths as long as third, except the last, which is three-fourths the third. Pronotum with distinct basal impressed line. Sides straight and slightly expanding three-fourths from the base, then converging abruptly. Before the middle there is a prominent longitudinal hump. Elytra without a scutellar spot, humped slightly at the basal third. From this hump a pair of low ridges extends anteriorly to half-way between the scutellum and the humerus. Some specimens have a slight hump on the suture two-thirds from the base also. Anterior tibial spurs of male shortened but not otherwise modified, spiniform. Posterior tibial spurs slender, spiniform. All of the femora and trochanters of the male are partly denuded behind, with long hairs, mainly dorsally, but also on the partly denuded area.

Type: Holotype ♀, A.N.S.P. No. 8183, examined.

Type locality: Ocala, Marion Co., **Florida**.

Additional localities: **Florida**: Gainesville. **Alabama**: Mobile. **Mississippi**: Lucedale. All of the specimens collected in September and October. Dr. Dietrich, who collected the Lucedale series, says that he found the species abundant at Lucedale on the stems of low grass.

Epicauta rehni Maydell

Epicauta rehni Maydell, 1934, Trans. Am. Ent. Soc. **60**:329.

Length: 6 to 9 mm. Black, densely clothed with flavo-cinereous pubescence, as in *rileyi* Horn. Easily distinguished from that species by the lack of a pit at the inner margin of the eye and lack of a scutellar spot on the elytra.

Head subtriangular. Vertex notched by the median suture, which extends to the level of the eyes and is continued forward by a narrow denuded line. A weak ridge extends from the inner margin

of the eyes obliquely backward to near the occiput, then runs close to the midline for a short distance. Eyes narrow, oblique, rather small. Antennae reaching to middle of elytra, two and two-thirds times as long as an anterior tibia, almost uniform in thickness. First segment moderately stout, reaching half-way across the eye; second more slender, three-fourths as long as first; third twice as long as second. The first three segments have some pale pubescence at the base. Fourth and following three-fourths as long as third, diminishing just perceptibly in thickness. Pronotum quadrate, with sides impressed slightly near the base. Median suture obscured by the pubescence. Basal impressed line distinct. Pubescence more or less erect, pointed in many different directions. Elytra without markings. Midline raised slightly on basal half and there is a feeble basal elevation. Underside without spots. Anterior tibiae of male with two stout spiniform spurs. Outer posterior tibial spur slender, pointed, inner sticklike. Posterior edge of male middle and posterior femora and trochanters denuded, shiny, margined above with long pubescence.

Type: Holotype ♀, A.N.S.P. No. 8184, examined.

Type locality: Schaeffer Canyon, Baboquivari Mts., **Arizona.**

Additional localities: **Arizona:** Baboquivari Mts., Tucson, Phoenix. Occurs in September and October. Apparently scarce.

Epicauta wheeleri Horn

Epicauta wheeleri Horn, 1873, Proc. Am. Phil. Soc. **13**:101, 107 (note).

Epicauta wheeleri Ulke, 1875, in U. S. Geog. and Geol. Surv. W. of 100th Merid. **5**:812, 825, Pl. 61, fig 4.

Length: 6 to 10 mm. Black, finely clothed with cinereous pubescence but for the dense rich rufous pubescence on the pronotum and a black patch at the base of the elytra, which is covered when the prothorax is raised.

Head subquadrate, shiny, sparsely but deeply punctured. Median suture distinct, margined by a narrow denuded area. Eyes prominent, moderately narrow, oblique. Antennae uniform in thickness, reaching to the basal fourth of the elytra, two and one-third times as long as an anterior tibia. Pronotum subquadrate, a little longer than wide. Median suture and basal impressed line distinct. With a pair of shallow impressions behind the middle. Pubescence dense, erect, rufous, margined all around the pronotum by cinereous pubescence. Scutellum densely clothed with cinereous

pubescence. Base of the elytra from scutellum half-way to the humerus with black pubescence, not visible when prothorax is raised. Below cinereous. Black spot on midline of second to fourth abdominal sternites. Legs cinereous-pubescent. Femora with apical black mark, sharply margined. Tibiae also with black apices but not so distinctly margined. Male anterior tibiae with two slender, spiniform spurs. Inner posterior tibial spur slender, spiniform, outer sticklike.

Type: Holotype, Horn Coll., A.N.S.P., examined.

Type locality: **Arizona.**

Additional localities: **Arizona:** Phoenix.

Epicauta diversipubescens Maydell

Epicauta diversipubescens Maydell, 1934, Proc. Am. Ent. Soc. 60:333.

Length: 6 to 9 mm. Black, densely clothed with pale tannish-cinereous pubescence, except for black scutellar spot, extending narrowly across the base of the elytra and black at angles of the pronotum. Pubescence on disc of pronotum short and velvety.

Head quadrate. Median suture distinct, bordered by a narrow, smooth denuded line. Antennal calluses small, not denuded. Eyes fairly prominent, rather narrow, transverse. Antennae reaching to the basal fourth of the elytra, two and one-third times as long as an anterior tibia, almost uniform in thickness. First segment short, stout, reaching about one-third across the eye in the male, a little shorter in the female; second short, half as long as first; third as long as first two. First and second segments and basal half of third with scattered cinereous hairs. Fourth and following three-fourths as long as third, practically equal in thickness. Pronotum as broad as long, broadly campanulate. Median suture distinct, supplemented by a narrow impression. Basal impressed line distinct. A broad denuded spot on the anterior angles and usually a smaller one on the posterior angles. The denuded surface is dull. The anterior spot is often extended toward middle by blackish pubescence. There is always a narrow area of pale pubescence before the anterior spots. Elytra with black scutellar spot, extended narrowly across the base. Pale below, with an elongate spot on the middle of the second to fifth abdominal sternites. An anterior lateral black spot on the second to fifth sternites, usually concealed by the elytra. Femora and tibiae with denuded tips, sharply de-

fined. Anterior tibiae of male with two spiniform spurs, the outer longer. Middle and posterior femora of male denuded behind, shiny, fringed above with long hairs. Posterior tibial spurs sticklike, the outer broader.
Type: Holotype, Leng Coll., U.S.N.M., examined.
Type locality: Albuquerque, **New Mexico.**
Additional localities: **Texas:** El Paso.

Epicauta aspera Werner

Epicauta aspera Werner, 1944, Psyche **50**:70.

Length: 7 to 10 mm. Black, densely clothed with cinereous, rarely ferrugineous, pubescence. Elytra with a scutellar spot, extended narrowly across the base. Abdominal sternites with a row of median black spots. Head not modified.

Head subquadrate, deeply and densely punctured and alutaceous, except for the very small smooth antennal calluses and shallowly impressed midline. Eyes moderately broad, normal. Antennae two and one-third times as long as an anterior tibia, cylindrical, tapering slightly. First segment short, stout, barely reaching the middle of the eye; second half as long as first, much narrower; third two and one-third times as long as the second, with a few cinereous hairs; rest a little shorter than the third. Sides of pronotum subparallel for the basal two-thirds, then converging abruptly. Sculpture of pronotum similar to that of head. Suture distinct, discernible to one-fourth from base, but very faint. A broad, shallow depression at the base. Second to fourth and sometimes fifth abdominal sternites with a median black spot, sometimes transverse, and a small spot anteriorly at the sides, usually concealed by the elytra. One specimen lacks the median spots. Apices of femora, tibiae, first tarsal segment and all of the rest of the tarsi black. Male anterior tibiae with two slender spiniform spurs. Posterior tibial spurs sticklike, rather long. Middle and posterior femora of male denuded behind and with long pubescence fringing the denuded area.
Type: Holotype ♂, M. C. Z. No. 26063, examined.
Type locality: Salida, **Colordado.**
Additional localities: **Colorado:** Masonville, Ft. Collins, Boulder, Morison, Boulder, B. Rotger C. R. **Texas:** Davis Mts. **New Mexico:** Jemez Springs, Barton. **Arizona:** White Mts., William-

son Valley, Copper Basin near Prescott. Occurs from August to November.

Epicauta immaculata (Say)

Fig. 32, 33

Lytta immaculata Say, 1823, Journ. Acad. Nat. Sci. Phila. **3**:304. Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:342.
Lytta articularis Say, 1823, Journ. Acad. Nat. Sci. Phila. **3**:304.
Lytta fulvescens Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:447.
Macrobasis immaculata, Horn, 1873, Proc. Am. Phil. Soc. **13**:93; Trans. Am. Ent. Soc. **12**:110.

Length: 12 to 20 mm. Black, rather densely clothed with ferrugineous to cinereous pubescence. No black markings on the elytra.

Head subquadrate. Median suture distinct but not conspicuous. Antennal calluses rather small, denuded, shiny. Eyes only moderately prominent, transverse, moderately narrow. Antennae tapering from the base, heavier, shinier and more compressed in the male than in the female. They reach to the basal third of the elytra and are two and one-half times as long as an anterior tibia. First segment exceeding the eye by one-fourth its length in the male, just perceptibly shorter in the female; second two-thirds as long as first; third and following one-fourth longer than second, gradually decreasing in thickness. The first three segments usually have some pale pubescence on the posterior margin. Pronotum quadrate, slightly bulging. Median suture distinct and a narrow median impression supplements it. Basal impressed line distinct. Visible portion of scutellum small. Tips and often the outer edges of femora, outer edges or all of tibiae and all of tarsi with black pubescence. Anterior tibiae of male with two slender spiniform spurs. Male anterior tarsi with the first segment just perceptibly longer than in the female, not otherwise modified. Posterior tibial spurs slender, spiniform.

Type: Say's type lost. Neotype ♂ and 9 neoparatypes in M. C. Z.
Type locality: "Inhabits **Arkansas.**" Of neotype: Cambridge **Nebraska.**

of *fulvescens* Lec.

Type: Lectotype ♂, new designation, Le Conte Coll. M. C. Z. No. 4989, examined.
Type locality: **Texas.**
Additional localities: **Texas**: Reeves Co., Pecos, Gillespie Co.,

Rio Grande City, Davis Mts., Kingsville, Alpine, Brewster Co., Clarendon, Corpus Christi, Victoria. **New Mexico:** Las Cruces. **Oklahoma:** Lawton. **Colorado:** Coolidge, La Junta, Las Animas, Ft. Collins. **Kansas:** Belvidere, Beeler, Rossville, Grinnelle, Ft. Hayes, Ellis, Garden City, Finney Co. **Nebraska:** Indianola, Cambridge, Bartley, Lincoln, Stratton. **Iowa:** Lewis, Fairfield. **Missouri:** Ranken. **Illinois:** Zeigler. **Indiana:** Clarke Co. State Forest, Jackson Co., Warrick Co. **Kentucky:** Berheim Forest. Occurs from June to September. Apparently common in the western part of its range.

Epicauta segmenta (Say)

Fig. 30, 31

Lytta segmenta Say, 1823, Journ. Acad. Nat. Sci. Phila. **3**:303.
Lytta segmentata Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:342.
Apterospasta valida Le Conte, 1858, Journ. Acad. Nat. Sci. Phila. (2) **4**:39.
Macrobasis segmentata, Horn, 1873, Proc. Am. Phil. Soc. **13**:93; 1885, Trans. Am. Ent. Soc. **12**:110. Champion, 1892, Biol. Cent.-Am. **4** pt. **2**:44.

Length: 12 to 24 mm. Black, with the pubescence short, mostly black. Pubescence always white on the posterior margin of the pronotum and there is usually some white pubescence on the coxae, thoracic segments, back part of head and posterior margins of the abdominal sternites.

This species is dimorphic. In one form the wings are as long as the elytra and in the other only one-third to one-half as long and usually much aborted. The reduced-winged form appears heavier because the elytra are more bulbous and they may even overlap slightly at the suture in mounted specimens. This led Le Conte to describe the form as a distinct species, *valida*, and place it in a separate genus, *Apterospasta*. However, the form seems to have no geographical distinctions from the full-winged form, nor is it limited to one sex. Small short-winged forms have been confused with *conferta* in collections but they can easily be distinguished by the white apices of the abdominal sternites.

Head subtriangular, with a very fine median suture. Antennae four-fifths as long as an anterior tibia, slightly heavier in the male than in the female. First segment reaching to hind margin of eye or slightly beyond; second half as long as first; third one and one-half times as long as first; rest a little shorter than the third,

decreasing gradually in thickness. Pronotum subquadrate, a little longer than broad, with a weak median suture and a very strong basal impressed line. Elytra always entirely black. Tibial spurs long and sticklike on all tibiae, not modified in the male. First segment of anterior tarsi slightly broader in the male.

Type: Say's type lost. Neotype ♂ and neoparatype ♀ in M. C. Z.

Type locality: "Purgatory River of the Arkansa." Neotype: Fort Hayes, **Kansas.**

of *valida*

Type: Lectotype ♂, new designation, Le Conte Coll., M. C. Z. No. 4990, examined.

Type locality: **Texas.**

Additional localities: **Nebraska:** Indianola, Cambridge, Bartley. **Kansas:** Ft. Hoge, Ellis. **Texas:** Alpine, Marfa, Chisos Mts., Davis Mts.; **New Mexico:** Tucumcari. **Arizona:** Chihuahua Mts., Fish Creek — White Mts., Palmerlee. Occurs from May to September.

Epicauta sublineata (Le Conte)

Lytta sublineata Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:447.

Macrobasis sublineata, Horn, 1873, Proc. Am. Phil. Soc. **13**:94; 1885, Trans. Am. Ent. Soc. **12**:109.

Macrobasis megacephala Champion, 1892, Biol. Cent.-Am. Coleop. **4** (pt. 2): 402.

Length: 16 to 25 mm. This is one of the most variable species of the genus as to color pattern. The holotype of *sublineata* has the head cinereous, the pronotum but for a pair of suffused dark patches also cinereous and the elytra with brownish suffusions between four fine lines. A specimen in the Fall Coll. from Eagle Pass is essentially like the type. One from Devil's River in the U.S.N.M. is similar but with the elytral suffusions very light and the dark marks absent from the pronotum. All these have dark suffusions on the abdominal sternites. These specimens can be distinguished from the female of *longicollis*, with which Dr. Horn synonymized the species, by their proportionately larger head, more slender antennae and by the presence of four dark lines on the elytra. *Albida* sometimes has dark lines on the elytra but there are only three when they occur and the basal segments of the antennae are rufous. The four remaining specimens I have seen have the elytra black with the tip cinereous. In one, the occiput, but for the median line, is black. This one also has the spots on the

pronotum and the abdominal bands enlarged and dark. In the others, these spots are weak and they have scattered cinereous pubescence on the elytra near the suture, at the base and near the side margins. Some specimens may possibly be confused with *segmenta* but that species has the elytra entirely black and has less pale pubescence on the pronotum.

Ground color black. Head large, suboval, with a fine suture. Eyes moderately narrow. Antennae long and slender, tapering from the first segment, which just exceeds the hind margin of the eye in the male and barely attains it in the female. Last segment only one-half the diameter of the first. (It is three-fourths the diameter of the first in the female of *longicollis*.) Antennae three times as long as an anterior tibia. (Two and one-half times in *segmenta*). Palpi pale rufous. Pronotum subquadrate, about two-thirds as wide as the head. (At least four-fifths in *segmenta*). Elytra with at least a humeral and scutellar spot, a narrow sutural line and four lines on the disc black and with at least the apex cinereous. Abdominal sternites with at least a darker suffusion toward the middle of some. Anterior tibiae of male with two spiniform spurs. Posterior tibial spurs moderately stout, blunt. The pad of the first segment of the male anterior tarsi is limited to the apical sixth so that the segment appears narrow.

Type: Holotype ♀, Le Conte Coll. M. C. Z. No. 4979, examined.
Type locality: Eagle Pass, **Texas.**
of *megacephala* Champion
Type: presumably in the British Museum.
Type locality: Monclova, Coahuila (**Mexico**)
Additional localities: **Texas**: Devil's River, San Diego, Goldthwaite. Three specimens taken in May, one in September.

Epicauta lauta (Horn)

Fig. 36

Macrobasis lauta Horn, 1885, Trans. Am. Ent. Soc. **12**:108.

Length: 8 to 16 mm. Tannish, finely, rather sparsely but evenly clothed with cinereous pubescence. Elytra with dark brown scutellar and humeral spots.

Head rounded, densely and finely punctured. Median suture distinct but not conspicuous. Antennal calluses low, smooth and shiny. Eyes large, prominent, transverse, moderately broad. Antennae

moderately long, slender, tapering from the basal segment, black, rather loosely jointed, not noticeably flattened. They attain the basal fifth of the elytra and are three times as long as an anterior tibia. Male with first segment reaching hind margin of eye, somewhat flattened and curved to fit over the eye; second and following three-fifths as long as first, tapering gradually. Female with first segment not flattened and only slightly curved, reaching three-fourths across the eye; second short, slender, half as long as the first; third and following three-fourths as long as first. Pronotum one-fourth longer than broad, campanuliform. Median suture and basal impressed line distinct. There is an inconspicuous transverse impression at the base. Apices of abdominal sternites darkened. Tips of femora, most of tibiae and all of tarsi also dark. Male anterior tibia somewhat curved, denuded behind, with a single spiniform spur. First segment of anterior tarsi of male a little shortened, slightly contorted. Posterior tibial spurs moderately broad, flattened.

Type: Lectotype ♂, new designation, Horn Coll. A.N.S.P. No. 8079, examined.

Type locality: **Arizona.**

Additional localities: **California:** Yermo, Amboina. **Arizona:** Mesa, Yuma, Gila Bend, Tucson, Phoenix, Orache, Avondale Ranch — Agua Fria R. **New Mexico:** Deming, Lordsburg, Mescalera, Mesilla. **Texas:** Sierra Blanca, Ft. Davis. Occurs from June to August.

Epicauta tenella (Le Conte)

Fig. 35

Lytta tenella Le Conte, 1858, Journ. Acad. Nat. Sci. Phila. (2) **4**:23.
Macrobasis tenella, Horn, 1873, Proc. Am. Phil. Soc. **13**:94; 1885, Trans. Am. Ent. Soc. **12**:108.

Length: 7 to 10 mm. Head, antennae, pronotum and legs pale tan. Elytra brown to black. Underside tan to partly brown or black. The pronotum may have darker suffusions. The whole surface is sparsely closed with short cinereous pubescence. Distinguished from *merkeliana* by the second segment of the antennae, which is shorter than the third.

Head subquadrate, partly denuded, sparsely punctured, the intervals finely punctulate, dull. Median suture fine but distinct.

Antennal calluses rather small, denuded, smooth. Last segment of labial palpi broad, smooth. Eyes large, prominent, moderately narrow, transverse. Antennae slender, filiform, reaching to basal fourth of elytra. First segment slender, straight, reaching just beyond the hind margin of the eye in the male and to just before the hind margin in the female; second two-fifths as long as first in male, half as long as first in female, slender; third the stoutest segment but still slender, half again as long as second; fourth and following four-fifths as long as third, almost uniform in thickness. Pronotum subcampanulate, one-fourth longer than broad. Median suture fine. Basal impressed line only slightly evident. Anterior tibiae of male with two spiniform spurs (not one as guessed by Horn in 1885), which are slightly heavier than in the female. Posterior tibial spurs flattened, pointed, the inner narrow, the outer somewhat broader.

Type: Lectotype ♀, new designation, Le Conte Coll. M. C. Z. No. 4988, examined.

Type locality: **Llano Estacado** (Texas or New Mexico).

Additional localities: **Arizona:** Safford, Tempe, Bowie, Tucson, Phoenix, Oracle, Texas Pass — Dragoon Mts.

Epicauta merkeliana Horn

Epicauta merkeliana Horn, 1891, Trans. Am. Ent. Soc. **18**:43.

Length: 7 to 10 mm. Resembles *tenella* but has more brown on the pronotum, is darker below and has the second segment of the antennae as long as the third.

Head subquadrate, moderately sparsely and finely punctured, shiny. Median suture distinct. Mouth parts luteous. Eyes prominent, black, broadly oval. Antennae elongate, slender. First segment slender, reaching to the hind margin of the eye; second and following subequal, a little more than half as long as the first, decreasing gradually in thickness. Pronotum half again as long as broad, narrow, campanulate. Median suture and basal impressed line distinct. A basal longitudinal impression present. Scutellum narrow, ferrugineous. Below mainly black, with some ferrugineous areas on the thorax and near the tip of the abdomen. Male with two slender spiniform spurs on the anterior tibiae. Posterior tibial spurs broad, pointed.

Type: Holotype, Horn Coll. A.N.S.P. No. 8091, examined.
Type locality: "**Arizona**, probably Fort Whipple."
Additional localities: **Arizona**: Tucson VII-30-37 by Klots. **Nevada**: Las Vegas IX-2-09.

Epicauta ochrea (Le Conte)

Fig. 42

Lytta ochrea Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:342.
Macrobasis ochrea, Horn, 1873, Proc. Am. Phil. Soc. **13**:91; 1885, Trans. Am. Ent. Soc. **12**:110. Champion, 1892, Biol. Cent.-Am. Coleop **4** pt. 2:401, Tab. 18, fig. 23, 23a.
Cantharis protarsalis Dugès, 1878, La Naturaleza **4**:63, Tab. 2, fig. 7a–b, 8a–c.

Length: 9 to 14 mm. Ferrugineous, rather sparsely clothed with silky ferrugineous pubescence. The moniliform antennae distinguish this species from all others in our fauna.

Head subtriangular, rather densely and deeply punctured. Median suture very evident and a narrow denuded line extends forward from it nearly to the clypeus. Antennal calluses small, glabrous, smooth. Eyes moderately broad, transverse. Antennae stout, moniliform, uniform in thickness. First segment in the male reaching to just behind the eye, curved to fit over the eye and excavated externally near the tip, in the female shorter and not as excavated; second one-fourth as long as first in male, one-third in female. The first two segments are shiny but not glabrous. Third and following a little longer than the second, moniliform. Pronotum quadrate, one-third longer than broad. Median suture very distinct. With an apical transverse impressed line. At the base there is a transverse impression, deep at the middle and merging laterally into the basal impressed line. Visible portion of scutellum small. Below darker than above. Anterior tibiae of male with a single stout, spiniform spur. First segment of male anterior tarsi short, smooth, contorted. Posterior tibial spurs rather stout, sticklike, the outer shorter.
Type: Holotype ♂, Le Conte Coll. M. C. Z. No. 4987, examined.
Type locality: "**Texas.**"
of *protarsalis* (Dugès)
Type: Presumably in Dugès Coll., Mus. Nacion. Hist. Nat., Mexico.
Type locality: **Guanajuato.**

Additional localities: **Texas:** Alpine, Davis Mts., Marfa, Ft. Davis. **New Mexico:** Snow Coll. **Arizona:** Douglass, Santa Rita Mts., Palmerlee. **California:** Eddy Coll.

Epicauta gissleri (Horn)

Fig. 43

Macrobasis gissleri Horn, 1878, Trans. Am. Ent. Soc. **7**:58; 1885, Trans. Am. Ent. Soc. **12**:110.

Length: 9 to 12 mm. Black or very dark brown, sparsely clothed with cinereous pubescence, which is denser on the suture and margins of the elytra. First segment of male anterior tarsi contorted.

Head subquadrate. Median suture fine, supplemented by a fairly broad denuded median line. Antennal calluses denuded, conspicuous. Eyes rather narrow. Antennae three and one-half times as long as an anterior tibia, with the segments strongly separated. First segment stout, reaching a little beyond the hind margin of the eye in the male and half-way across the eye in the female; second short, one-third as long as first in male, one-half in female. The first and second segments have scattered dark and cinereous pubescence. Third segment one and one-half times as long as second; fourth and following a little shorter than the third, the fourth being the stoutest segment, the rest tapering gradually, all cylindrical. Pronotum a little longer than broad, broadly campanuliform. Basal impressed line distinct; median suture indistinct. There is a shallow midbasal impression and sometimes a pair of small lateral impressions behind the middle. Elytra with often indistinct scutellar and humeral dark spots. Legs slender. All of the femora and trochanters of the male are denuded and somewhat flattened on the posterior surface; the middle tibiae are curved and the middle and posterior femora have fringes of long hairs; anterior tibiae denuded behind except for a tuft of normal cinereous pubescence at the "elbow;" anterior tibiae with a single stout, spiniform spur; first segment of anterior tarsi partly denuded, short, contorted, the second long, longer than the second and third together. Posterior tibial spurs moderately slender, spiniform.

Type: Lectotype ♂, new designation, Horn Coll. A.N.S.P. No. 8079, examined.

Type locality: Grant Co., **New Mexico.**

Additional localities: **Arizona:** Williams, Pinal Mts. Rare. Occurs in June and July.

Epicauta parkeri Werner

Epicauta parkeri Werner, 1944, Psyche **50**:71.

Length: 10 to 12 mm. resembles *gissleri* in general appearance. The pubescence tends to be sparser and more easily rubbed off. The antennae are distinctly more slender, with the segments less distinctly separated. In the form of the head it is very distinct from *gissleri*. The head is elongate-triangular and the mandibles go one-third their length beyond the labrum, have a distinct tooth, and cross at the tips.

The lengths of the antennal segments are in the same proportion as in *gissleri*. In the allotype male the segments are broader and flat toward the apex. I believe this specimen is abnormal. The only other male seen has the antennae broken off at the second segment.

Type: Holotype ♀, Parker Coll., deposited in Calif. Acad. Sci.
Type locality: White Mts., **Arizona**, July 8, 1933.
Additional localities: **Arizona:** San Rita Mt., Globe, Flagstaff, Baboquivari Mts. June and July.

Epicauta fabricii (Le Conte)

Fig. 47, 48

Lytta cinerea Fabricius, 1798, Suppl. Ent. :119, *nec Meloe cinereus* Forster, 1771, in Cat. An. N. Am. :62. Both belong to *Epicauta*.
Lytta fabricii Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:343.
Lytta debilis Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:344.
Macrobasis unicolor, Horn, 1873, Proc. Am. Phil. Soc. **13**:92; 1885, Trans. Am. Ent. Soc. **12**:110 (in part).
Macrobasis fabricii, Brown, 1940, Can. Ent. **72**:231.

Length: 9 to 15 mm. Black or dark brown, fairly densely clothed with cinereous pubescence. Elytra with dark humeral and scutellar spots. First segment of male antennae shiny, flat, reaching occiput; second slightly more than half as long. In the female, the first segment reaches the hind margin of the eye and the second segment is one and one-third times as long as third.

Head subtriangular, moderately densely punctured. Median

suture distinct. Antennal calluses moderate in size, smooth, shiny. Eyes fairly narrow, transverse. Male antennae reaching to basal fourth to third of the elytra; first segment reaching the occiput, curving slightly, flattened; second a little more than half as long as first, flattened, narrower than first, straight, or curved very slightly. The first two segments shiny, usually margined behind with sparse cinereous pubescence. Rest of segments subequal, the third a little shorter than the rest, tapering gradually. In the female, the first segment slightly exceeds the hind margin of the eye; second three-fourths as long as first; third three-fourths of second and slightly shorter than the following, which are as in the male. Pronotum one-fourth longer than broad, campanuliform. Median suture and basal impressed line distinct. Elytra with indistinct to distinct humeral and scutellar spots. Perfect specimens have denser pubescence on the margins of the elytra. Anterior tibiae of male with two slender, spiniform spurs. First segment of anterior tarsi of male somewhat elongated but not otherwise modified. Posterior tibial spurs flattened, spiniform, the outer broader.

Type: Since *fabricii* is a substitute name for a homonym, the type must be the type of *Lytta cinerea* Fabricius. The location of this type is unknown to the author. If this type cannot be located, the neotype should be the specimen labelled *Fabricii* in the Le Conte collection.

Type locality: "Habitat in America Dom. Hybner."

of *debilis* (Lec.)

Type: Holotype ♀, Le Conte Coll. M. C. Z. No. 4984, examined.

Type locality: **New York.**

Additional localities: Maine, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Virginia, West Virginia, Maryland, Georgia, Tennessee, Indiana, Illinois, Michigan, Wisconsin, Iowa, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas: Tyler, Montana, Utah, Colorado, New Mexico, Manitoba.

A common species. Feeds generally on leguminous herbs — alfalfa, clover, *Baptisia*, eating the succulent growth and flowers. It seems to choose the softest legume in the area. In eastern Massachusetts, *Baptisia tinctoria* seems to be preferred, according to Mr. Frost. In northern Illinois, *Baptisia leucantha* and alfalfa are preferred. Occurs in early summer.

Epicauta murina (Le Conte)

Fig. 49, 50

Cantharis unicolor Kirby, 1837, in Richardson's Fauna Boreali-Americana **4**:241, nec *Cantharis unicolor* Fald., 1835, Nouv. Mem. Soc. Nat. Moscow **4**:195.

Lytta murina Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:344.

Macrobasis unicolor, Horn, 1873, Proc. Am. Phil. Soc. **13**:92 (in part).

Macrobasis murina ? Le Conte, 1876, U. S. Geog. Surv. W. of 100th Merid., Appendix J. J. :520.

Macrobasis murina, Fisher, 1919, Proc. Ent. Soc. Wash. **21**:1 (in part). Chittenden, 1926, Bull, Brooklyn Ent. Soc. **21**:118. Brown, 1940, Can. Ent. **72**:232.

Length: 7 to 11 mm. Except for the pubescence, this species cannot be distinguished from *subglabra* (Fall). On the dorsal surface, the pubescence is almost twice as dense as in *subglabra*, causing a dark grey color. Some females can be confused with females of *fabricii* but the second segment of the antennae is almost as long as the first and at least one and one-half times as long as the third. It is two-thirds as long as the first ond one and one-third times as long as the third in *fabricii*. Feeds on legumes in early summer. Two records on potatoes.

Type: Holotype ♂, Le Conte Coll. M. C. Z. No. 4983, examined.

Type locality: **Lake Superior.**

Additional localities: **New Hampshire:** Mt. Washington 5000–6000 ft. **New Brunswick:** Bathurst. **Michigan:** Eagle Harbor. **Wisconsin:** Hazelhurst, Bayfield. **Minnesota:** Beaver R.—Lake Co., Highland (on potatoes). **Iowa:** Carroll Co. **North Dakota:** Mandan. **South Dakota:** Elmore, Black Hills. **Nebraska:** Mitchell (on potatoes). **Montana:** Huntley, Sidney. **Wyoming:** Sheridan. **Colorado:** Hooper.

Epicauta subglabra (Fall)

Macrobasis murina, Fisher, 1919, Proc. Ent. Soc. Wash. **21**:1 (in part).

Macrobasis subglabra Fall, 1922, Can. Ent. **54**:173. Brown, 1940, Can. Ent. **72**:232.

Length: 6 to 10 mm. Black, sparsely clothed with short brown hairs, which are not ordinarily visible to the unaided eye. Second segment of male antennae two-thirds as long as first, curved.

Head subtriangular, minutely punctulate, dull. Median suture

fine but distinct. Antennal calluses small, shiny. Eyes not very prominent, quite small, oblique. Antennae of male with first segment flattened, straight, attaining the occiput or a little beyond; second two-thirds as long as first, as long as the next three and one-half, flattened, curved outward; third segment the shortest, two-sevenths as long as the second; rest slightly longer than third, gradually tapering, slightly flattened. Female with the first segment reaching the hind margin of the eye; second four-fifths as long; third and following two-thirds as long as second and only slightly flattened. Pronotum one-fourth longer than broad, subcampanulate. Median suture and basal impressed line fine, distinct. Surface as on head. Elytra with no sign of basal spots. Pubescence below a little denser than above, especially on the posterior margins of the abdominal sternites. Anterior tibiae of male with two slender spiniform spurs. Male anterior tarsi with first segment slightly elongated but not otherwise modified. Posterior tibial spurs slender, spiniform, equal.

Type: Holotype ♂, Fall Coll. M. C. Z. No. 24297, examined.

Type locality: Edmonton, **Alberta.**

Additional localities: **Manitoba:** Berens River, Maskado, Aweme, Winnipeg. **Minnesota:** Park Point—Duluth. **North Dakota:** Beach, Star Co., Mandan. **South Dakota:** Volga, Browns Valley. **Idaho:** Paris. **Arizona** ?: Madera Canyon—Santa Rita Mts., McKay's Peak—White Mts., Flagstaff. All of the records are from June and July. Apparently limited to legumes.

Epicauta flavocinerea (Blatchley)

Fig. 51, 52

Macrobasis flavocinereus Blatchley, 1910, Cat. Coleop. Indiana: 1359.
Macrobasis flavocinerea, Brown, 1940, Can. Ent. 72:231.

Length: 9 to 11 mm. The "flavocinereous" color of the pubescence cannot be relied upon to distinguish this species. All of the specimens I have seen are flavocinerous but *fabricii* may be of almost the same color. The male has the first segment of the antennae reaching to halfway between the eye and the occiput, not conspicuously enlarged nor flattened and has long hairs on the hind margin of the middle and posterior femora. The female has the first antennal segment reaching to the hind margin of the eye, with the second segment equal to the third. The second seg-

ment is one and one-third times as long as the third in the female of *fabricii*.

The general form is very similar to that of *fabricii*. Only the differences will be noted in the following description. Antennae of male reaching to the basal sixth of the elytra, two and one-half times as long as an anterior tibia. First segment fairly slender, not flattened, curved to fit over the eye, reaching to half-way between the eye and the occiput; second two-fifths as long as first, more slender. The first and second segments have more pubescence than in *fabricii*. Third and following two-thirds as second, tapering gradually. Female with the first segment reaching to the hind margin of the eye, second just perceptibly longer than the following. Male anterior tarsi not modified. Posterior tibial spurs sticklike, the outer a little broader than the inner. Posterior face of femora of male smooth, denuded but for scattered silky hairs, which are as long as the femur is broad. These are scattered evenly over the smooth surface.

Type: Holotype ♂, Blatchley Coll., Purdue University, examined.
Type locality: Starke Co., **Indiana**.
Additional localities: **Illinois**: Willow Springs VI–VII. **Pennsylvania**: "Penn." C. V. Riley. **Texas**: "Tex." Fall Coll. Apparently everywhere rare. Not over a dozen specimens were seen. Brown lists it from Byron and Lumington, **Ontario** and Aweme, **Manitoba**.

Epicauta languida (Horn)

Macrobasis languida Horn, 1895, Proc. Calif. Acad. Sci. (2) **5**:252.

"Form slender, general color pale luteous clothed with slightly paler pubescence, antennae and tarsi black. Thorax longer than wide, a feebly impressed median line. Tarsi black with a ring of whitish pubescence at the base of each joint. Length, .40 inch; 10 mm.

Male. Antennae setaceous the first joint as long as the next two, not sinuate at apex, second three-fourths as long and equal to the next three joints together. Anterior tibiae with two terminal spurs, the first joint of tarsi longer than the second. Last ventral segment incised.

This species resembles *linearis* very closely and it is possible that the females will be difficult to separate. San Jose del Cabo."

No specimen of this species has been seen. Horn's reference to *linearis* should be changed to *polingi* Werner, which he mistook for *linearis*.

Epicauta tenuilineata (Horn)

Fig. 41

Macrobasis tenuilineata Horn, 1894, Proc. Calif. Acad. Sci. (2) 4:436.

Length: 7 to 15 mm. Ferrugineous, clothed with cinereous pubescence, rather sparse over the body but denser on the margins and four narrow vittae on each elytron.

Head suboval. Median suture distinct, supplemented on the front by a narrow denuded line. Antennal calluses oblique, narrow, denuded, smooth. Eyes large, bulging, quite broad. Male antennae with the first two segments flat, sparsely punctured, shiny, with very short hairs from the punctures. First segment reaching three-fourths across the eye, narrow; second one-third longer than first, more flattened and broader; third and following very slender, the third one-third as long as second, fourth and following one-third longer than third. First segment of female antennae reaching two-fifths across the eye; second equal to it. Neither is flattened and both have cinereous pubescence. The proportions of the rest of the segments are the same as in the male but the segments are thicker, especially toward the base. Pronotum slightly longer than broad, broadly campanuliform. Basal impressed line distinct; median suture indistinct, replaced by a conspicuous denuded line. Elytra with scutellar and humeral brown spot. Two of the pubescent lines on the elytra arise from the base and two from just behind the humerus. Femora darkened at tip. Anterior tibiae of male with two spiniform spurs. Male anterior tarsi not modified. Posterior tibiae with the spurs flattened and blunt, the outer broader.

Type: Cotypes should be in the California Academy of Science No. 153.

Type locality: Sonora, **Mexico** and San Jose del Cabo.

Additional localities: **Arizona:** Tucson, Baboquivari Mts., Tempe, Phoenix. Occurs from May to July.

Epicauta excors (Fall)

Macrobasis excors Fall, 1909, Can. Ent. **41**:166.

Length: 14 mm. Black, quite densely clothed with cinereous pubescence. First two segments of antennae long; second as long as first, which attains the occiput in the male and the hind margin of the eye in the female. Palpi dark. Elytra with scutellar and humeral spots.

Head subquadrate. Median suture fine but distinct. Antennal calluses quite large but narrow, denuded, shiny. Palpi black. Eyes large, fairly prominent, transverse, quite broad. Male antennae reaching two-thirds the length of the elytra. First segment shiny, flattened, slightly incurved, just exceeding the occiput; second as long as first, shiny, slightly narrow, also incurved; third one-third as long as second, narrow; fourth to last almost twice as long as third, becoming very slender toward the tip. Female with the antennae reaching one-third the length of the elytra. First segment reaching to hind margin of eye; second just perceptibly shorter; rest as in the male but a little thicker. Pronotum campanuliform, one-fourth longer than broad. Basal impressed line distinct. Median suture absent but a narrow denuded line replaces it. Elytra with small scutellar and humeral black marks. Male anterior tibiae with two slender, spiniform spurs; anterior tarsi with first segment somewhat elongated, but not otherwise modified. Posterior tibiae with inner spur spiniform, outer blunt, both rather stout.

Type: Holotype ♂, Fall Coll. M. C. Z. No. 24296, examined.
Type locality: El Taste, **Lower California.**
Additional localities: Santa Rosa, **Lower California** Aug. (Frost Coll.)

Epicauta tenuis (Le Conte)

Fig. 34

Lytta tenuis Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:343.
Macrobasis tenuis, Horn, 1873, Proc. Am. Phil. Soc. **13**:92; 1885, Trans. Am. Ent. Soc. **12**:110.

Length: 10 to 14 mm. Slender, rather densely clothed with cinereous to flavocinereous pubescence. Body color dark brown to black. No basal marks on the elytra. Palpi luteous. Antennae slender, long; reaching three-fourths the length of the elytra in the

male, with the first two segments smooth, very long straight. Female easily distinguished from the female of *fabricii* by the second segment of the antennae, which is as long as the first.

Head subquadrate. Median suture distinct. Antennal calluses strongly raised, denuded, shiny. Palpi luteous. Eyes moderately prominent, narrow, transverse. Male antennae with the first segment attaining occiput, slender, flattened, shiny; second slightly curved, three-fourths as long as first, also shiny; third one-third as long as second; fourth and following one-third longer than second third, becoming very slender toward the tip. Female with the first segment reaching two-thirds across the eye; second as long as first but more slender; third three-fourths as long as second; fourth and following slightly longer than third, tapering gradually but not as slender as in the male. Pronotum subcampanulate, one-fourth longer than broad. Median suture distinct, supplemented toward the middle of the disc by a narrow denuded line. Basal impressed line distinct. Male with a single spur on the anterior tibiae, with the first segment of the anterior tarsi a little elongated but not otherwise modified. Posterior tibial spurs slender, sticklike, the outer shorter.

Type: Lectotype ♂, new designation, Le Conte Coll. M. C. Z. No. 4985, examined.

Type locality: **Georgia.**

Additional localities: **Florida:** Edgewater Beach, Biscayne.

Epicauta purpurea (Horn)

Fig. 8, 44

Macrobasis purpurea Horn, 1885, Trans. Am. Ent. Soc. **12**:108. Champion, 1892, Biol. Cent.-Am.-Coleop. **4** pt. 2:397, Tab. 18, fig. 19–19a.

Length: 8 to 12 mm. Black, pubescence on body cinereous, with a pair of black marks on head and pronotum, elytra black with margins and a distinct vitta cinereous. Antennae of male with first segment elongate, curved. The black pubescence may be tinged with brown, suggesting a purplish color.

Head subtriangular, densely punctured and punctulate. Median suture distinct. Antennal calluses moderate in size, denuded, smooth. Eyes small, fairly narrow, transverse. Antennae of male with first segment almost attaining occiput, slender, curved, broadly excavated externally near the tip; second segment two-

fifths as long as first, flattened on underside, forming a sort of clasping organ with the excavation of the first. The first two segments are moderately densely punctured and punctulate. Third three-fifths as long as second; fourth and following one and one-half times as long as third, gradually decreasing in thickness. Antennae of female with first segment straight, reaching to hind margin of eye; second slender, seven-tenths as long as first; third equal to second; fourth and following slightly longer, decreasing just perceptibly in thickness. Pronotum quadrate. Median suture distinct, supplemented apically by a narrow denuded area. Basal impressed line distinct. A fairly deep midbasal impression present. Scutellum with cinereous pubescence. Median vitta of elytra starting at the middle of the base and ending near the apex, well defined. Below, except for tips of femora, most of tibiae and tarsi, with cinereous pubescence. Anterior tibiae of male with a single straight, spiniform spur; anterior tarsi not modified. Inner posterior tibial spur slender, spiniform, considerably longer than outer, which is sticklike.

Type: Holotype ♂, A.N.S.P. No. 8086, examined.

Type locality: **Arizona.**

Additional localities: **Arizona:** Baboquivari Mts., Sta. Rita R., Catalina Mts.

Epicauta polingi Werner

Fig. 37, 40

Macrobasis linearis, Horn, 1885, Trans. Am. Ent. Soc. **12**:109, 110. *nec* Le Conte, 1858, Journ. Acad. Nat. Sci. Phila. (2) **4**:23.

Epicauta polingi Werner, 1944, Psyche **50**:71.

Length: 8 to 16 mm. Elongate, slender. Head, pronotum and scutellum black or very dark brown, elytra luteous, the whole rather loosely and evenly clothed with cinereous to luteous pubescence. First segment of male antennae elongate, flat; second one-third as long as first.

Head subquadrate. Median suture distinct. Antennal calluses moderate in size, denuded, smooth. Clypeus, labrum and mandibles brown, the palpi luteous. Eyes moderately narrow, transverse. First segment of male antennae exceeding the head by one-third its length, about one-sixth longer than an anterior tibia, not over one-sixth as broad as long, flattened behind and with some cinereous pubescence on this flat surface; second narrower, elongate —

oval, one-third as long as first. The first two segments are smooth and shiny. They are about equal in length to the rest of the antenna. Third and following a little more than half the length of the second, gradually tapering. Female with the first segment reaching three-fourths across eye; second three-fifths as long as the first; third and following slightly shorter than second. Pronotum slightly longer than broad, campanuliform. Median suture distinct, bounded posteriorly by a shallow transverse basal impression. Elytra with small brown scutellar and humeral spots. Legs ferrugineous, the rest of the underside black or dark brown, with cinereous pubescence. Anterior tibiae of male mostly denuded, somewhat arcuate, with a single spiniform spur. Posterior tibial spurs stout, spiniform.

Type: Holotype ♂, M. C. Z. No. 26071, examined.

Type locality: Davis Mts., **Texas.**

Additional localities: **Texas:** Alpine, Sabinol, Devil's River, Rio Frio, Cotulla, Big Bend Park — Brewster Co. **New Mexico:** Cloudcroft, Alamagordo. **Arizona:** Douglass, Santa Catalina Mts. Recorded from April to September but mainly in June and July.

Epicauta liebecki Werner

Fig. 38

Epicauta liebecki Werner, 1944, Psyche **50**:72.

Length: 9 to 14 mm. Close to *polingi*. Head and pronotum black or dark brown, elytra brown, much darker than in *polingi*. Pubescence cinereous, denser on the suture and margins of the elytra.

Otherwise as in *polingi* except that in the male the first segment of the antennae is one-fifth as broad as long, the third segment is distinctly shorter than the fourth, and the first two segments are distinctly longer than the following. Legs a little stouter. Posterior tibial spurs quite slender.

Type: Holotype ♂, M. C. Z. No. 26068, examined.

Type locality: Tucson, **Arizona.**

Additional localities: **Arizona:** Congress Junction, Wickenburg, Columbia (on *Prosopis pubescens*), Tempe, Sabina Canyon, Santa Catalina Mts., Lowell, Globe, Bowie, Ajo, Pima Co., Baboquivari Mts. **Sonora:** Imuris (on pigweed). Taken from mid-May to mid-July.

Epicauta arizonica Werner

Fig. 39

Epicauta arizonica Werner, 1944, Psyche **50**:72.

Length: 9 to 13 mm. Uniformly luteous to dull brown, with cinereous pubescence. First segment of antennae of male exceeding the head by not more than one-sixth of its length, a little shorter than an anterior tibia, a little less than one-fifth as broad as long. First two segments one-fifth shorter than the rest. Eyes prominent, much larger than in *polingi* or *liebecki* and a little broader. Otherwise as in *polingi*. Averages smaller than either.

Type: Holotype ♂, M. C. Z. No. 26062, examined.

Type locality: Baboquivari Mts., **Arizona**.

Additional localities: **Arizona**: Tucson, Wickenburg, Nogales, San Bernardino Ranch — Cochise Co., Capitan Mt., Cañon Lake, Globe, Phoenix, Rice, Santa Rita Mts. **Sonora**: Arizpe. Occurs from mid-July to mid-September. Commonest in August.

Epicauta torsa (Le Conte)

Fig. 45, 46

Lytta torsa Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:343.

Macrobasis torsa, Horn, 1873, Proc. Am. Phil. Soc. **13**:91; 1885, Trans. Am. Ent. Soc. **12**:110.

Length: 7 to 11 mm. Black, quite sparsely clothed with short cinereous pubescence, as in *murina*. Easily distinguished from that species by the S-shaped first antennal segment in the male and an indication of the external apical excavation of the first segment in the female.

Head subtriangular, finely rugulose, quite densely punctured. Median suture distinct, supplemented by a smooth line, which continues, narrower, to the clypeus. Antennal calluses of moderate size, denuded, shiny. Eyes not very prominent, rather narrow, transverse. Male with the first segment of the antennae stout, reaching the occiput, with a 60-degree bend outward half-way and a slight inward bend at the apex; second also stout, two-fifths as long as first, excavated on the inner face as if to form a clasping organ with the outer excavation of the first segment. Rest of segments slender, but not as slender as in *fabricii* or *murina*. Third

segment two-fifths as long as second, slightly broader than long; fourth and following a little longer than third, decreasing slightly in thickness. Female with the first segment reaching to the hind margin of the eye; slightly bent, with a trace of an external apical excavation; second three-fifths as long as first; third and following three-fourths as long as second, decreasing slightly in thickness, not as heavy as in the male. Pronotum quadrate, as broad as long, with the sides parallel for the basal three-fourths, then converging abruptly. Transverse basal impression strong. Median suture indistinct, but replaced by a fairly strong median impression from base to middle. There is a transverse impression near the apex, extending down the sides. Elytra with black scutellar and humeral spots, which are indistinct because of the dark general color. Anterior tibiae of male with a single spiniform spur. Male anterior tarsi with the first segment flattened, slightly broadened apically. Inner spur of posterior tibiae spiniform, the outer sticklike, shorter.

Type: Lectotype ♂, new designation, M. C. Z. No. 4982, examined.

Type locality: **Texas.**

Additional localities: **Texas:** Victoria. **Alabama:** Mobile. **Mississippi:** Poplarville. **Florida:** Winter Park, Little River. **North Carolina:** Black Mts. **Massachusetts:** Wellesley, Framingham, Randolph. Occurs in the spring. Was common in Massachusetts in 1909, according to Mr. Frost. I have seen no specimens taken there since that date.

Epicauta longicollis (Le Conte)

Fig. 28, 29

Lytta longicollis Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:343.

Macrobasis longicollis ,Horn, 1873, Proc. Am. Phil. Soc. **13**:90; 1885, Trans. Am. Ent. Soc. **12**:110. Champion, 1892, Biol. Cent.-Am. Coleop. **4** pt. **2**:397.

Length: 15 to 25 mm. Elongate, slender, black, densely clothed with cinereous to tannish-cinereous pubescence. Black scutellar and humeral spot present on the elytra. Male antennae with the first segment elongate, cylindrical, excavated externally near the tip. Female antennae with the second segment shorter than the third. It is as long as the third in both sexes of *immaculata* (Say).

Head subtriangular, densely and finely punctured. Median suture visible only before the eyes. Antennal calluses small, glabrous, smooth. Fronto-clypeal suture very strong. Eyes not prominent, narrow. Male antennae with the first segment extending one-third beyond the occiput, stout but slender, almost cylindrical, only slightly flattened. There is a slight excavation externally near the apex. Second segment one-sixth as long as the first; third and fourth slightly longer; rest a little longer than the fourth, gradually diminishing in thickness. The first four segments are shiny. Female antennae with the first segment exceeding the hind margin of the eye by one-fourth, thicker toward the apex; second one-third as long as first. First two segments rather densely pubescent. Third and fourth one-third longer than second; rest slightly longer than fourth, gradually decreasing in thickness. Pronotum subquadrate, one-third longer than broad. Sides parallel for the basal three-fourths, then converging gradually. Median suture indistinct but there is a fairly strong median impression from base to middle. A strong transverse basal impression connects with this. There is also a transverse impression at the apex, extending down the sides. Elytra with black humeral and scutellar spot. Partly denuded specimens seem to have faint lines on the elytra as in *sublineata* but these are due to abrasion on slightly raised lines. Below cinereous. There are sometimes a few black marks on the thoracic pleurites. Tips of femora, tibiae and all of tarsi black. Tibiae of mixed black and cinereous pubescence. Anterior tibiae of male with a single slender, spiniform spur. Posterior tibial spurs both slender, spiniform.

Type: Leetotype ♂, new designation, Le Conte Coll. M. C. Z. No. 4978, examined.

Type locality: **New Mexico**, Santa Fe.

Additional localities: **Texas**: Alpine, Marfa. **New Mexico**: Faywood, Albuquerque. **Arizona**: Chiricahua Mts., Kaibab National Forest, Chi No Valley — Tempe, Fort Grant, Prescott, Sulphur Spring Valley. **California**: Berkeley. Occurs in June and July.

Epicauta atrivittata (Le Conte)

Fig. 24

Lytta atrivittata Le Conte, 1854, Proc. Acad. Nat. Sci. Phila. **7**:224.

Macrobasis atrivittata, Horn, 1873, Proc. Am. Phil. Soc. **13**:90; 1885, Trans. Am. Ent. Soc. **12**:110.

Length: 20 to 25 mm. Elongate, rather slender. Black, densely pubescent. Pubescence cinereous, with the occiput black or having a pair of large black spots, pronotum with a pair of large black spots, elytra with a pair of broad black vittae arising from the scutellum and humerus and united before the apex. Below with black marks on the thoracic pleurites and sternites and on the basal two-thirds of the abdominal sternites. Legs mainly black. First segment of antennae of male greatly enlarged, flattened apically, excavated externally near the apex. A magnificent species, averaging over 25 mm. long.

Head subquadrate. Median suture indistinct. Antennal calluses large, smooth, shiny. Palpi dark brown, broad and flattened. Last segment of labial palpi suborbicular. Eyes moderately narrow. Male antennae with the first segment exceeding occiput by one-third, shiny, flat, curved, greatly broadened beyond the middle, excavated externally near the tip; second short, suborbicular, with a short spine at the outer apex, one-fifth as long as first; third broader than long, half as long as second; fourth as long as second, as broad as long; fifth and sixth one-third longer than fourth, also stout; seventh and following as long as sixth but narrower, uniform in length and thickness. Female with the first segment reaching to just beyond the eye, somewhat flattened; second one-third as long as first; third and following a little longer than the second, tapering slightly toward the apex. Pronotum one-third longer than broad. Sides parallel for the basal three-fourths, then converging abruptly. Median suture absent but replaced by a median impression, narrow before the middle and deep, fairly broad behind. Basal impressed line deep, margined with long pubescence. Visible portion of scutellum abnormally small, narrow. Anterior femora with cinereous pubescence on both edges, rest on outer edge only. Coxae and trochanters all with cinereous pubescence. Rest of legs with black pubescence. Anterior tibiae of male with a single short, spiniform spur. First segment of male anterior tarsi a little more elongated than in the female but not otherwise modified. Posterior tibial spurs slender, sticklike, the outer longer.

Type: Lectotype ♂, new designation, Le Conte Coll. M. C. Z. No. 4980, examined.

Type locality: "San Diego trip." Pin label "Webb b."

Additional localities: **Texas**: between Pecos R. and Guadaloupe Mts., Rio Grande — Brewster Co., El Paso. **New Mexico**: Roswell. **Mexico**: Tlahualilo. Occurs in June and July. Seems to be quite scarce.

Epicauta albida (Say)

Fig. 25, 27

Lytta albida Say, 1823, Journ. Acad. Nat. Sci. Phila. **3**:305. Le Conte, 1853, Proc. Acad. Nat. Sci. Phila. **6**:344.
Lytta luteicornis Le Conte, 1854, Proc. Acad. Nat. Sci. Phila. **7**:84.
Macrobasis albida, Horn, 1873, Proc. Am. Phil. Soc. **13**:89; 1885, Trans. Am. Ent. Soc. **12**:109. Champion, 1892, Biol. Cent.-Am. Coleop. **4** pt. **2**:397.

Length: 13 to 24 mm., usually 22–24. Elongate, rather slender, black with dense cinereous to yellow-cinereous pubescence. Oblique black markings on at least some of the abdominal sternites and usually two longitudinal black marks on the pronotum. Often black marks on the thoracic pleurites. First two segments of the antennae luteous, sparsely pubescent, the rest tan to dark brown. Palpi pale luteous.

Head subquadrate, finely and densely punctured and punctulate. Median suture distinct. Antennal calluses fairly large, denuded, smooth. Eyes moderately narrow, transverse. Labial palpi of male with last segment broad. Male antennae with the first segment extending slightly beyond the occiput, flattened, slightly curved and excavated externally near the apex; second one-fourth as long as first; third half as long as second; fourth half again as long as third; the rest slightly longer than the fourth, decreasing gradually in thickness. Female with the first segment of the antennae barely reaching to the hind margin of the eye, with a trace of the apical excavation; second half as long as first; the rest as in the male. The first two segments have some conspicuous dark pubescence. Pronotum subquadrate, slightly longer than broad. Median suture absent but there is a fairly deep median depression on the basal half. Elytra with black humeral and scutellar spots. There is occasionally a pair of fine dark lines from the middle of the base and the humerus, united behind. Tip of femora, outer edge of anterior tibiae, both edges and terminal eighth of the rest of the tibiae black. Anterior tibiae of male slightly denuded behind. Male with two slender, spiniform spurs on the anterior tibiae, slightly elongated first segment on the anterior tarsi. Posterior tibial spurs slender; inner pointed, longer, outer blunt.

Type: Say's type lost. Neotype ♂ and neoparatypes in M. C. Z.
Type locality: "Inhabits **Arkansas.** I obtained it near the Rocky

Mountains." Neotype: La Junta, Bent Co., **Colorado** VI-24-25-1885 H. F. Wickham.

of *luteicornis* Le Conte

Type: Lectotype♂, new designation, Le Conte Coll. No. 4977, examined.

Type locality: **Texas**: "Laredo to Ringgold Barracks, Mr. Weise."

Additional localities: **Kansas**: Logan Co., Garden City, Reno Co., Wellington, Ellsworth. **Colorado**: Holyoke, Rocky Ford, Pueblo, Julesburg. **Oklahoma**: Mangum. **Texas**: Victoria, Harlingen, Dallas, Llano, Brownsville, Mason (on potatoes and ground burnut), Cypress Mills, Canadian, Goldthwaite, Alice. **New Mexico**: Roswell. Occurs from June to September.

Epicauta texana Werner

Fig. 26

Epicauta texana Werner, 1944, Psyche **50**:73.

Length: 18 to 21 mm. This species is closely related to *albida* (Say) but differs as following: Eyes narrower. First segment of antennae of male elongate, flattened, extending one-third beyond the occiput. There are no black markings on the ventral side. Only one specimen has a slight trace of the pronotal marks. The pubescence seems denser and flatter than in *albida*.

Type: Holotype ♂, Ohio State University, examined.

Type locality: Davis Mts., **Texas**.

Additional localities: **Texas**: Alpine 4400–6000 ft., Marfa. Taken in July and August.

Epicauta virgulata (Le Conte)

Fig. 53

Macrobasis virgulata Le Conte, 1866, Smiths. Misc. Coll. **6** no. 167, 2nd ed.: 156. Horn, 1873, Proc. Am. Phil. Soc. **13**:91; 1885, Trans. Am. Ent. Soc. **12**:110.

Macrobasis hirsutipubescens Maydell, 1934, Trans. Am. Ent. Soc. **60**:334.

Length: 7 to 10 mm. Black or dark brown, with rather dense ferrugineous or cinereous pubescence. Elytra with black scutellar and humeral spots and a line of denser pubescence from the middle of the base to near the apex. Legs pale tan.

Head subquadrate, rather finely and densely punctulate, with

scattered punctures. Median suture fine but distinct, accentuated by a narrow denuded line. Antennal calluses broad, moderately elevated, smooth, shiny. Eyes large, prominent, broad, especially in the male. Male antennae reaching to the middle of the elytra. First segment reaching to just behind the eye, slender, curved, slightly excavated externally near the apex; second small, one-sixth as long as first; third two and one-half times as long as second; fourth the broadest segment, one-fourth longer than third; following becoming gradually longer and more slender. Apical segments extremely slender. Female with antennae heavier than in the male, reaching to basal fifth of elytra. The broadest segment is the first. First segment rather slender, curved, reaching to just beyond the middle of the eye; second two-fifths as long as first; third almost twice as long as second; rest becoming gradually longer but not as markedly as in the male. Pronotum one-third longer than broad, broadly campanulate. Basal impressed line distinct but not denuded. Median suture distinct, supplemented by a denuded line except at base and apex. Elytra with conspicuous black scutellar and humeral spots. Margin and a median line with denser pubescence, sometimes indistinct. Legs pale tan. Tips of femora, tibiae and tarsal segments black or dark brown. Anterior tibiae of male with a single slender spiniform spur. First segment of male anterior tarsi short, denuded on inside, extending over the second segment on the outside. Posterior tibial spurs slender, spiniform.

Type: Lectotype ♂, new designation, Le Conte Coll. M. C. Z. No. 4981, examined.

Type locality: San Jose del Cabo, **Lower California.**

of *hirsutipubescens*

Type: Holotype ♂, A.N.S.P. No. 8181, examined.

Type locality: "**Texas.**"

Additional localities: **Texas:** Chisos Mts., El Paso, Nevill Spring —Brewster Co., Ft. Stockton, Terrell Co., Davis Mts., Boquillas. **Arizona:** Douglass, Nogales, Globe, Wickenburg, Orcale, Gila Bend Mts., Texas Pass—Dragoon Mts. **Sonora:** Nogales. Occurs from May to August.

Epicauta linearis (Le Conte)

Fig. 54, 55

Lytta linearis Le Conte, 1858, Journ. Acad. Nat. Sci. Phila. (2) **4**:23.
Macrobasis linearis, Horn, 1873, Proc. Am. Phil. Soc. **13**:94.

Length: 8 to 9 mm. This species is not the *linearis* of collections. Horn mistook *polingi* for it because of the general similarity of color pattern. Only a single female of the true *linearis*, the type, was seen by him. Apparently a very rare species. Head, pronotum and below black; elytra and legs ferrugineous. The whole rather densely clothed with tannish cinereous pubescence.

Head subquadrate, rather densely but finely punctured. Median suture distinct. Antennal calluses quite large, reaching beyond the inner margin of the eye, smooth, shiny. Eyes prominent, moderately broad, transverse. Male antennae reaching the basal third of the elytra, three times as long as an anterior tibia. First segment attaining the occiput, fairly slender, curved, flattened, deeply excavated externally near the apex, smooth, sparsely pubescent; second cylindrical, one-fifth as long as first, small; third half again as long as second; fourth flattened, broader than third; one-fourth longer than second and third; following also flattened, increasing just perceptibly in length, very narrow beyond the sixth segment. Female with first segment reaching two-thirds across eye; second and following as in the male but not as broad toward the middle or as slender apically. Pronotum one-third longer than broad, narrowly campanuliform. Basal impressed line and median suture distinct. Elytra with a trace of a scutellar spot but no humeral spot. Male anterior tibiae with a single stout spiniform spur; anterior tarsi with first segment slightly shortened, contorted. Posterior tibial spurs spiniform.

Type: Holotype ♀, Le Conte Coll. M. C. Z. No. 4986, examined.

Type locality: Llano Estacado (**W. Texas** or **E. New Mexico**) Aug. 4, Capt. Pope.

Additional records: 1 ♂, 1 ♀ "Tex." Eddy Coll. (M. C. Z.) 1 ♂ "Tex." J. B. Smith Coll. (U.S.N.M.)

Epicauta maculifera (Maydell)

Macrobasis maculifera Maydell, 1934, Trans. Am. Ent. Soc. **60**:335.

Length: 8 to 10 mm. Black or dark brown, legs ferrugineous, clothed with rather dense cinereous pubescence, which is denuded in small spots. Superficially resembles the *maculata* group because of the spots but stands near *fumosa* Dugès in the form of the antennae.

Head subquadrate. Median suture distinct. Antennal calluses

small but denuded, shiny. Eyes prominent, rather broad, transverse. Antennae of male with the first segment attaining the occiput, slender, slightly broader apically, excavated externally near the tip; second one-fourth as long as first, flattened and hollowed internally. First two segments shiny, sparsely pubescent. Third and following half as long as second, decreasing in length slightly toward the tip, loosely jointed. Female with the first segment reaching three-fourths across the eye; second half as long as first. First two with sparse cinereous pubescence. Third a little longer and broader than the second; following becoming just perceptibly shorter and somewhat narrower toward the tip. Pronotum quadrate, as broad as long. Median suture and basal impressed line distinct. Elytra with indistinct scutellar and humeral dark spots. Below with denuded spots as above. Anterior tibiae of male with a single spiniform spur. Male anterior tarsi with first segment slightly contorted, not denuded. Posterior tibial spurs moderately broad, flattened, pointed.

Type: Holotype ♂, A.M.N.H.

Type locality: San Xavier, near Tucson, **Arizona**, July 24, 1916.

Additional localities: **Arizona**: Tempe, Phoenix.

REJECTED SPECIES

Epicauta levettei Casey

Epicauta levetti Casey, 1891, Ann. Lyc. N. Y. Acad. Sci. **6**:171.

Casey described this species from the Le Vette cabinet, based on specimens with "Col." and "Colo." state labels. There are specimens with similar state labels in the Psota collection and also some with "Tex." labels. The type is identical with *anthracina* (Erichson) from northern South America. Probably these specimens are old dealers' specimens with erroneous labels. I have seen no authentic specimens from even as far north as Panama.

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PLATES

PLATE 1

PLATE 1

Antennae

Fig. 1. *E. floridensis* ♂
2. *E. floridensis* ♀
3. *E. cinerea* ♂
4. *E. cinerea* ♀
5. *E. Solani* ♂
6. *E. brunnea* ♂
7. *E. brunnea* ♀
8. *E. purpurea* ♂ (posterior tibia)

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2

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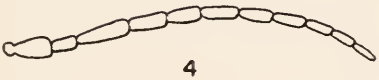

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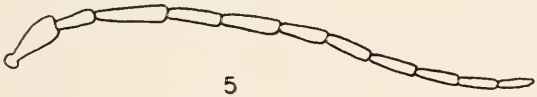

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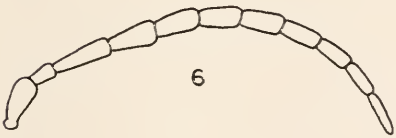

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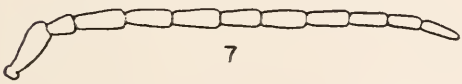

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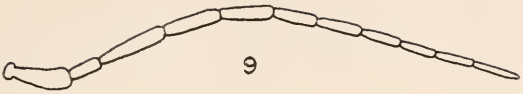
PLATE 2

PLATE 2

Antennae

Fig. 9. *E. lemniscata*
10. *E. occidentalis*
11. *E. californica*
12. *E. alastor* ♂
13. *E. alastor* ♀
14. *E. pensylvanica* ♂
15. *E. insignis* ♂
16. *E. oregona* ♂



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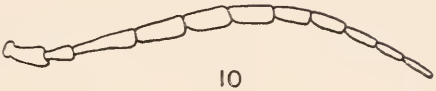

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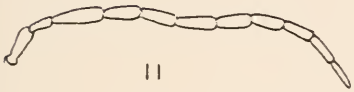

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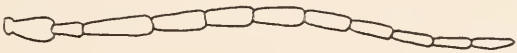

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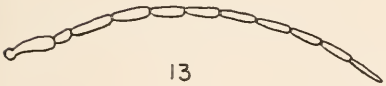

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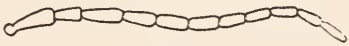

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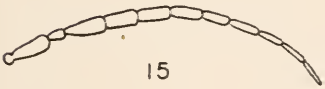

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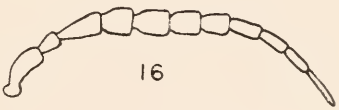

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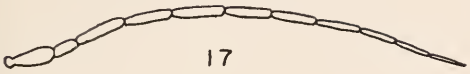
PLATE 3

PLATE 3

Antennae

Fig. 17. *E. ingrata* ♂
18. *E. atrata*
19. *E. ferruginea*
20. *E. fortis*
21. *E. sericans*
22. *E. puncticollis*
23. *E. oblita*



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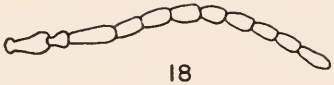

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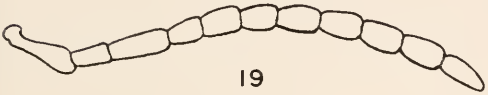

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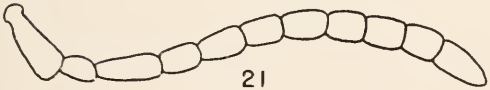

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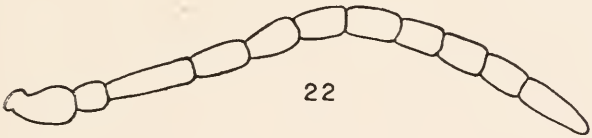

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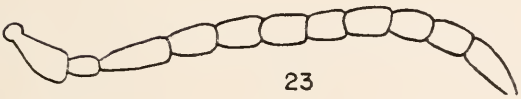

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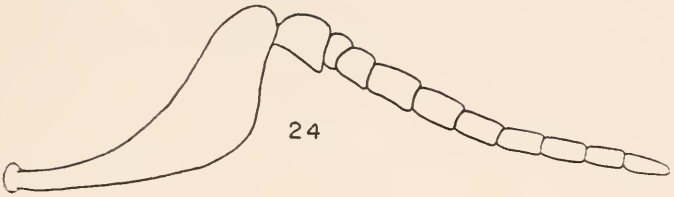
PLATE 4

PLATE 4

Antennae

Fig. 24. *E. atrivittata* ♂
25. *E. albida* ♂
26. *E. texana* ♂
27. *E. albida* ♀
28. *E. longicollis* ♂



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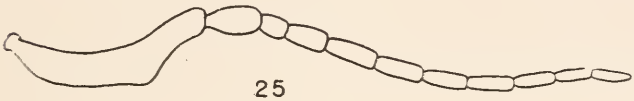

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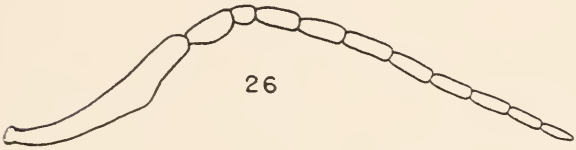

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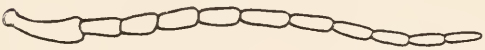

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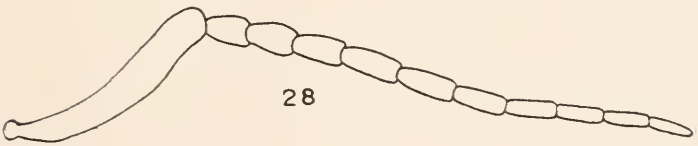

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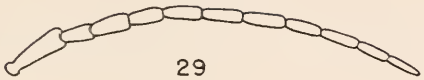
PLATE 5

PLATE 5

Antennae

Fig. 29. *E. longicollis* ♀
30. *E. segmenta* ♂
31. *E. segmenta* ♀
32. *E. immaculata* ♂
33. *E. immaculata* ♀
34. *E. tenuis* ♂



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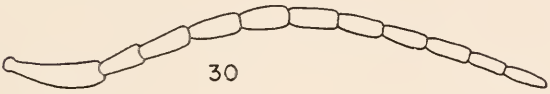

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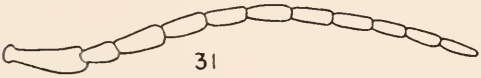

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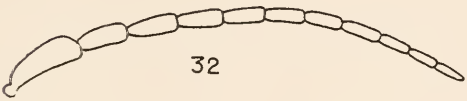

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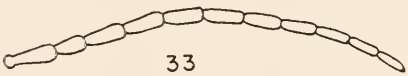

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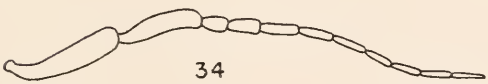

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PLATE 6

PLATE 6

Antennae

Fig. 35. *E. tenella* ♂
36. *E. lauta* ♂
37. *E. polingi* ♂
38. *E. liebecki* ♂
39. *E. arizonica* ♂
40. *E. polingi* ♀
41. *E. tenuilineata* ♂
42. *E. ochrea* ♂
43. *E. gissleri* ♂
44. *E. purpurea* ♂

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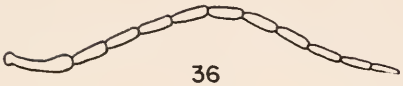

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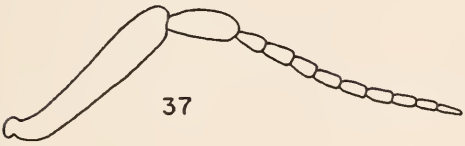

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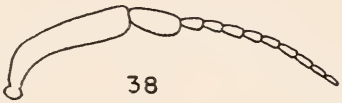

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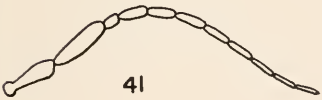

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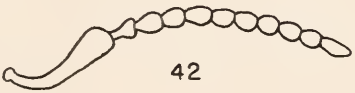

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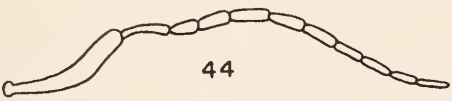

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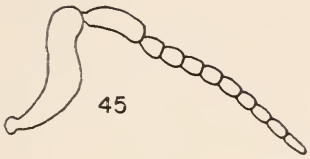
PLATE 7

PLATE 7

Antennae

Fig. 45. *E. torsa* ♂
46. *E. torsa* ♀
47. *E. fabricii* ♂
48. *E. fabricii* ♀
49. *E. murina* ♂
50. *E. murina* ♀
51. *E. flavocinerea* ♂
52. *E. flavocinerea* ♀
53. *E. virgulata* ♂
54. *E. linearis* ♂
55. *E. linearis* ♀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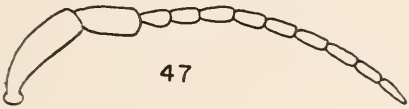
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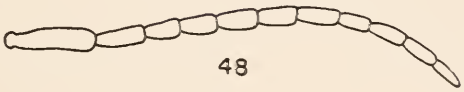
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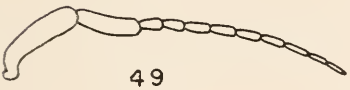
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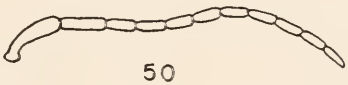
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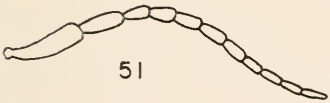
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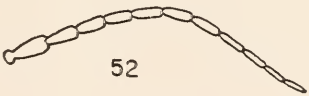
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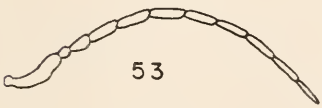
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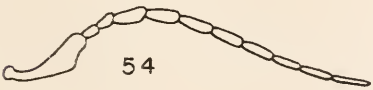
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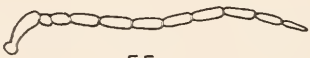
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